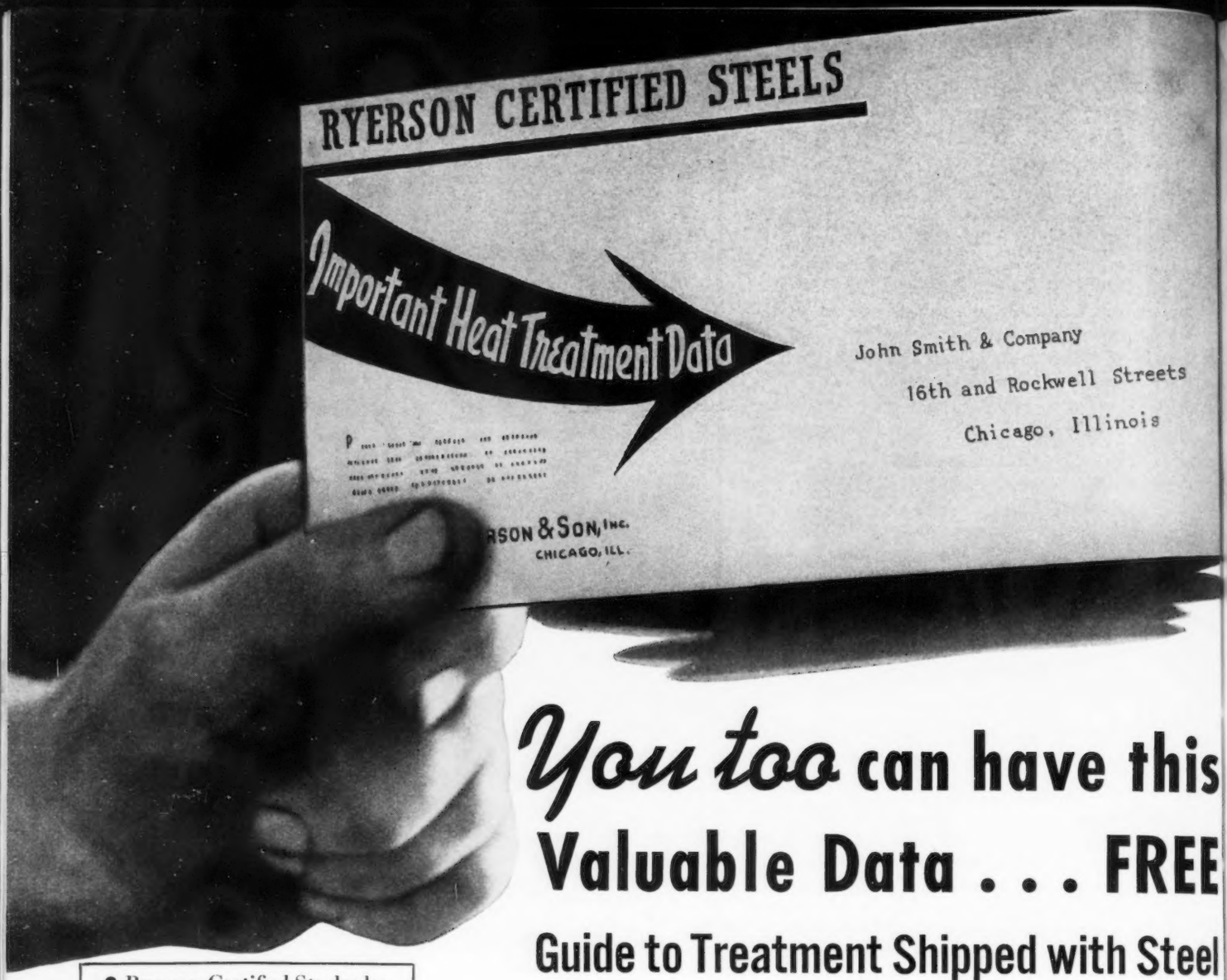
THE IRON AGE

Contents

February 1, 1940



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▲▲▲ THE IRON AGE ▲▲▲

FEBRUARY 1, 1940

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FOOL'S GOLD

CONTRAST the gold situation now, with that in 1914 at the start of the World War.

In 1914, the United States had less than 2 billion dollars in gold, or about 30 per cent of the world's monetary gold, of which about one billion, three hundred million was in Government hands. Today, the United States Government holds about 17 billion dollars worth of gold, or between 55 and 60 per cent of the world's total gold reserve and with none of it in the hands of our private citizens.

In 1914, gold was moving strongly to London and Paris. Today, and for two or three years past, gold has been moving to the United States at the rate of from 2 to 3 billion dollars per annum. Most of it is being put back into the earth from which it came, but at Fort Knox, Ky., instead of Alaska, South Africa and points East.

In 1914, all important countries of the world were on the gold standard. Today all countries are on an inconvertible paper standard. The hope and expectation of our Government and our people is that eventually all will return to a "gold standard."

If the present flow continues, we will shortly have a "corner" on the world's gold supply and the soil under Fort Knox will assay a million times richer to the ton than the famed and fabulous Bonanza.

But will it then be worth the labor of digging it up?

The New Deal, through its clever advisers, found a way to reduce domestic debts by devaluing the dollar some 40 per cent.

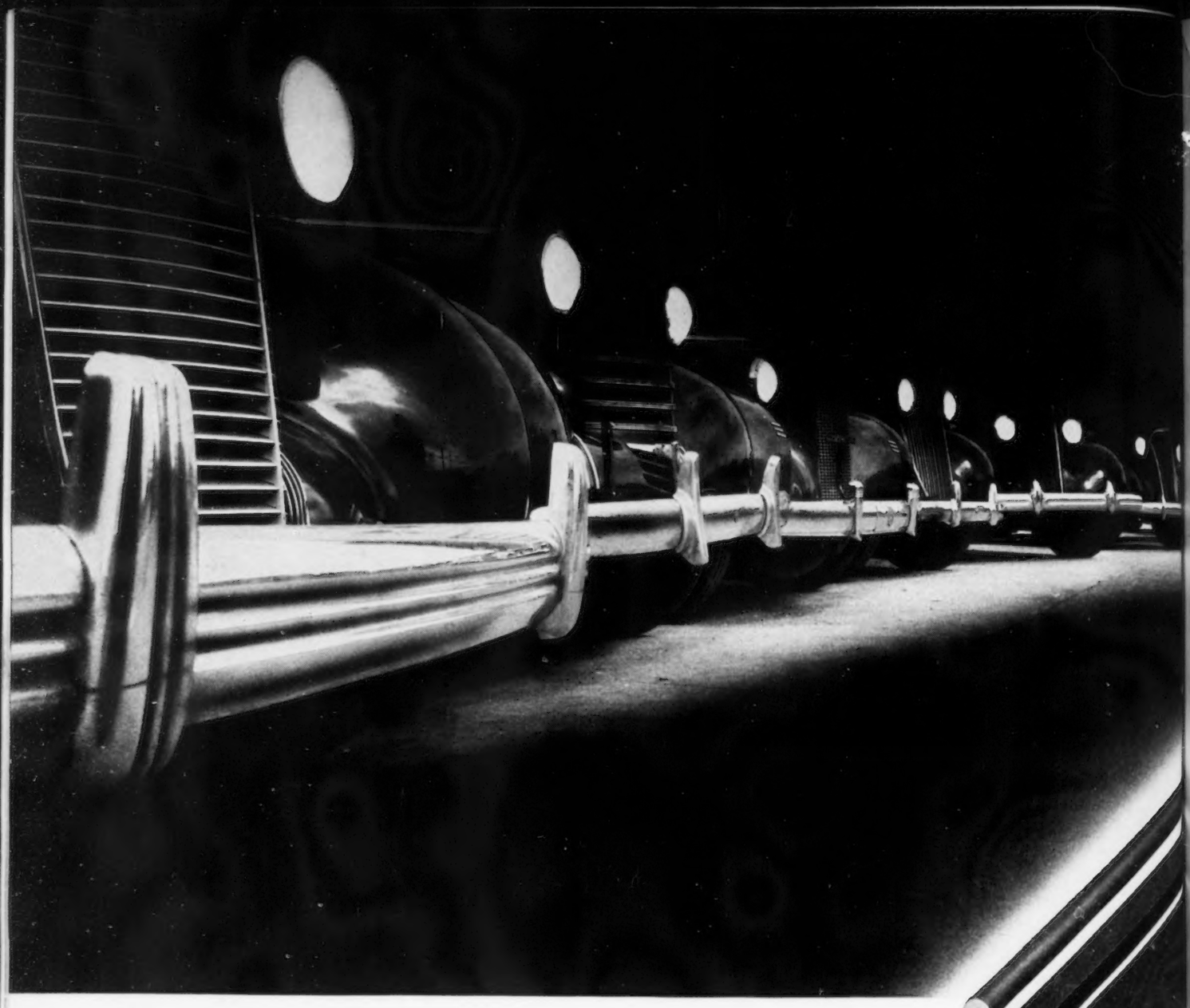
But like many other New Deal white rabbits, that was not new.

Our European debtors after the World War found a way to reduce their debts 100 per cent by repudiating the paper which was their payment for goods.

After this "cash and carry" war is over, and after having bought our goods largely with gold, suppose the "have not" gold nations are forced to abandon gold as a medium of exchange?

Where would that put us?

J. H. Van Deventer



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D.P.H. MEASUREMENTS With ROCKWELL HARDNESS TESTER

By J. H. HRUSKA
Metallurgical Engineer, Electro-Motive Corp., La Grange, Ill.

THE author herein reports data on the quite unethical procedure of combining the definitely advantageous Rockwell principle of speedier measurement of depth of impression in hardness testing together with the more logical and metallurgically accurate application of the 136 deg. diamond pyramid indentor. Tests on metals, from soft copper to hard tool steel, indicate that the accuracy of depth of measurements of the Rockwell machine lend themselves very accurately to determining D.P.H. hardness.

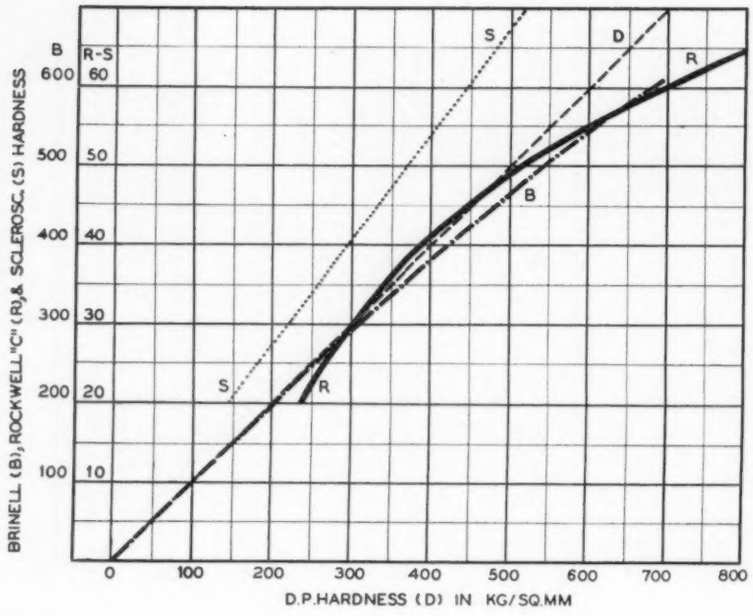
THE undisputable preference of metallurgists for the pyramid principle of hardness testing has generally been justified by the theoretical relationship with an ideal hardness scale of linear magnitude. Besides, only one scale covers the entire hardness range of the softest to the hardest technical material (see Fig. 1).

On the other hand, the simplicity of using the universally known Rockwell testing apparatus, together with the independence of the human factor upon the obtained results, has placed the Rockwell, beyond doubt, at the head of all American-made hardness testing machines. This simple factor as well as the unreasonably high cost of most of the diamond pyramid testing machines retarded their anticipated adoption by America's industries to an almost exclusively laboratory sphere of interest.

In justice to the pyramid hardness testers, it must be recognized that the numerous but rather small load-impression ranges of the Rockwell machine are definite shortcomings of the Rockwell method. This does not enable operators or engineers to comprehend the actual relative hardness of many materials without reference to elaborate conversion tables. Conversions of hardness numerals are, however, nearly always sources of considerable controversies and suspicions, even if the tests refer to the same principle or identical apparatus.

As an initial step toward some sort of simplification of the many confusing hardness scales of today, the writer has conducted series of tests by using a 136 deg. diamond pyramid in the newest type Rockwell hardness tester. This admittedly somewhat unethical procedure was intended to combine the definitely advantageous Rockwell principle of speedier measurement of depth of impression together with the more logical and metallurgically accurate application of the 136 deg. diamond pyramid indentor. The temptation was also too obvious to cover the technically important range from decidedly soft metals such as copper and aluminum to the hardest tool steels and alloys.

The Rockwell testing machine used in the present research work was a new apparatus of 12 in. capacity, equipped with a thoroughly calibrated 120 deg. diamond cone. The comparative 136 deg. diamond pyramid indentor was so designed as to permit the full use of the standard chuck of the Rockwell machine. The complete assembly of the apparatus is shown in Fig. 2. Particular care has been exercised in duplicating the principles set forth primarily by the originators of the pyramid hardness test. Thus, the loads of the machine were first calibrated at 60, 100, and 150 kg. by



utilizing a standardized proving ring. The apparatus used as well as its arrangement is shown in Figs. 3 and 4.

In order to verify the reliability of the 136 deg. pyramid in the light of recent work by F. B. Fuller (see Transactions A.S.M., Dec. 1937, pp. 1198-1206), measurements for the squareness of the resultant impressions were made with a 60, 100, and 150 kg. load on an alloy steel block of Rockwell C-63.5 hardness. Fig. 5 illustrates the observed variations in appearance.

The reported readings were further checked by means of a standard metallurgical microscope of newest design at 100 magnifications. The ocular of the measuring microscope is an exact duplicate of the standard Vickers eyepiece, but of domestic make. The Rockwell apparatus was, in all tests made, set so that the duration of actual loading conformed to minimum time required to conduct standard diamond pyramid tests. As mentioned above, special care was taken to approach precision of the Rockwell instrument to that of the highest type of precision instruments available from domestic and foreign sources to carry out hardness tests with 136 deg. diamond pyramid.

Any attempt to use the Rockwell machine for pyramid hardness tests must be theoretically correct and essentially duplicable. Analysis of the factors entering into the functional performance of each testing machine makes it clear that the Rockwell scale is proportional only to measured depth of impression, whereas, the pyramid hardness is conventionally a function of the length of the diagonal in regard to a square impression. Both are, of course, equally dependent upon the load and somewhat upon the time of their application.

The diamond pyramid hardness numeral (D.P.H.) is, therefore, the quotient of load over the area of the impression of the 136 deg. pyramid. The load is always stated in kilograms when testing hardness by either the Rockwell or D.P.H. method. However, dimensional characteristics are ascertained by multiples of 0.00008 in. in the Rockwell method, but they are referred to in millimeters in all pyramid hardness testing. Bearing these two differences in mind, it becomes necessary to express the depth of penetration in practically interchangeable units. The standard Rockwell equipment indicates thus only Rockwell units, but the pyramid hardness may equally well be calculated from the length of the diagonal, as shown in Fig. 6.

From consideration of simple geo-

ABOVE

FIG. 1—The pyramid principle of hardness testing has the only linear scale which covers the entire range of the softest to the hardest technical material.

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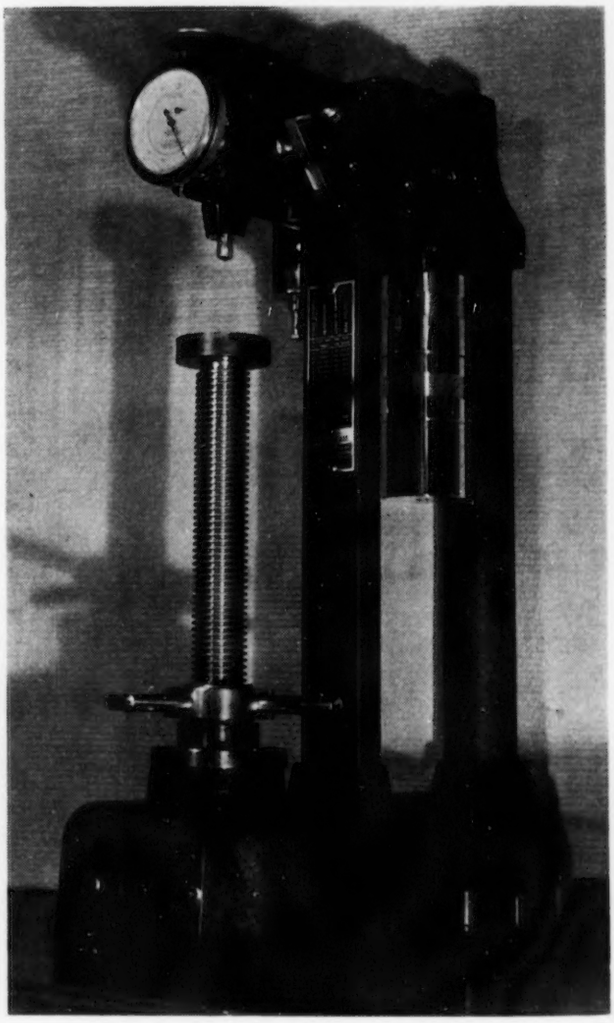
AT RIGHT

FIG. 2—This Rockwell hardness tester is equipped with a D.P.H. indentor.



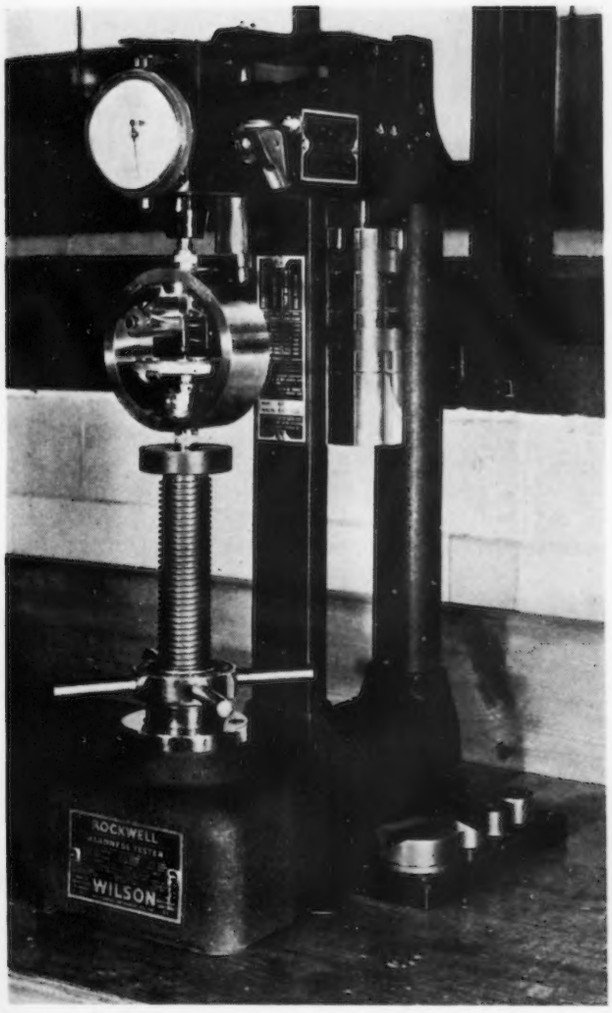


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FIG. 3 — Calibration of the Rockwell hardness tester.

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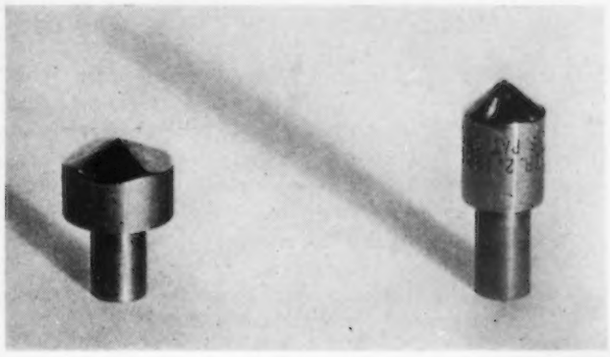
FIG. 4—D.P.H. (left) and Rockwell brale (right) indentors.



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BELOW

FIG. 5 — Photomicrographs (at 100 diameters) of D.P.H. indentations on test blocks of Rockwell C-63.5 at 60 kg. (left) and 100 kg. (right) loads.

metrical displacement, it is apparent that the depth of indentation of the 136 deg. square based pyramid is one-seventh of the diagonal of the impression. This decrease in sensitivity of the D.P.H. test on a Rockwell machine necessitates a more accurate reading of the indicator values on the dial of the apparatus, but it is naturally offset by the possibility to check also the diagonal by means of a suitable micrometer microscope. The latter dimension, i.e., the length of the diagonal, is the customary index of the D.P.H. numeral and is ordinarily compiled in tabular form. Such tables accompanying each hardness testing device are, however, standardized to somewhat different loads than those available with a Rockwell machine. With this in mind Table I is offered in an effort to enable the operator to determine D.P.H. numerals without much delay. From practical experience with this method it was found that the 60 kg. and perhaps the 100 kg. loads are probably the most suitable ones for general investigations the 60 kg. load having a slight advantage for thinner materials tested.

In the original research experiments the materials given in Table II were selected. The pieces measured 2x1x½ in. The surfaces were ground and polished to increase the accuracy of all measurements. Four tests were made on each test block and averages used in the computations referred to in the subsequent paragraphs. No attempt was made to check the chemical compositions of the specimens against those furnished by the suppliers, because interest was exclusively in the performance of the diamond indentors rather than in a study of material characteristics.

Almost needless to say, the correlating Rockwell tests were made under standard conditions with a new diamond. In making these measurements, it was realized that the C scale is based primarily on a measurement of depth conditions. In order to theoretically calculate these minute depths, it is customary to subtract the dial reading from 100 and to multiply the resultant dial units or divisions by a constant of 0.00008 in. which is equal to about 0.002 mm. Actual tests made by calculating these depths indicated that there is a slight deviation from the hypothetical figures. These calcula-

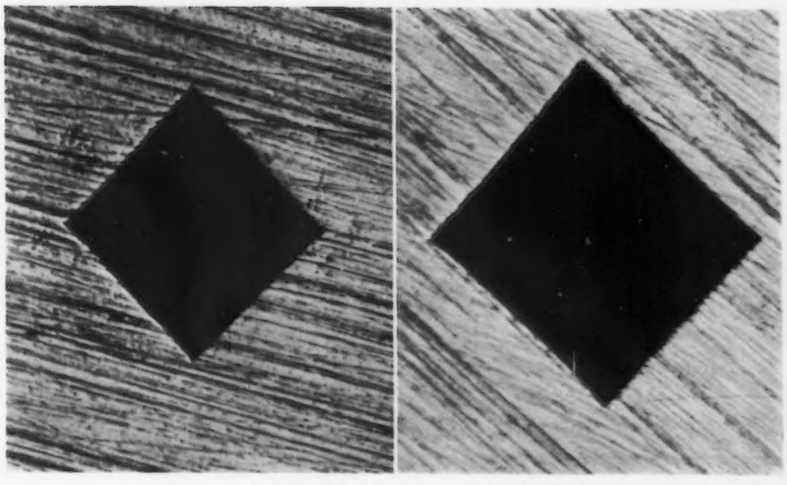


TABLE I

Diamond Pyramid Hardness Numbers

(For 60 Kg. Load)

Diagonal, in mm.	Hardness Number	Diagonal, in mm.	Hardness Number	Diagonal, in mm.	Hardness Number	Diagonal, in mm.	Hardness Number
0.312	1140	0.392	724	0.61	299	1.01	109
0.314	1126	0.394	717	0.62	289	1.02	107
0.316	1114	0.396	709	0.63	280	1.03	105
0.318	1100	0.398	702	0.64	272	1.04	103
0.320	1086	0.400	696	0.65	263	1.05	101
0.322	1073	0.405	678	0.66	255	1.06	99.0
0.324	1059	0.410	660	0.67	248	1.07	97.2
0.326	1046	0.415	645	0.68	241	1.08	95.4
0.328	1034	0.420	630	0.69	234	1.09	93.6
0.330	1021	0.425	616	0.70	227	1.10	92.0
0.332	1009	0.430	602	0.71	221	1.11	90.3
0.334	997	0.435	588	0.72	215	1.12	88.7
0.336	985	0.440	574	0.73	209	1.13	87.1
0.338	974	0.445	561	0.74	203	1.14	85.6
0.340	962	0.450	548	0.75	198	1.15	84.1
0.342	951	0.455	536	0.76	193	1.16	82.6
0.344	940	0.460	524	0.77	188	1.17	81.3
0.346	929	0.465	513	0.78	183	1.18	79.9
0.348	919	0.470	502	0.79	178	1.19	78.6
0.350	908	0.475	492	0.80	174	1.20	77.3
0.352	898	0.480	482	0.81	170	1.21	76.0
0.354	888	0.485	472	0.82	166	1.22	74.8
0.356	878	0.490	462	0.83	162	1.23	73.5
0.358	868	0.495	453	0.84	158	1.24	72.3
0.360	858	0.500	444	0.85	154	1.25	71.2
0.362	849	0.505	436	0.86	150	1.26	70.1
0.364	840	0.510	428	0.87	147	1.27	69.0
0.366	831	0.515	420	0.88	144	1.28	67.9
0.368	822	0.520	412	0.89	140	1.29	66.9
0.370	813	0.525	404	0.90	137	1.30	65.8
0.372	804	0.530	396	0.91	134	1.31	64.8
0.374	795	0.535	389	0.92	131	1.32	63.9
0.376	787	0.540	382	0.93	129	1.33	62.9
0.378	778	0.545	376	0.94	126	1.34	61.9
0.380	770	0.550	370	0.95	123	1.35	61.0
0.382	762	0.56	356	0.96	121	1.36	60.1
0.384	754	0.57	342	0.97	118	1.37	59.3
0.386	747	0.58	330	0.98	116	1.38	58.4
0.388	739	0.59	319	0.99	114	1.39	57.6
0.390	732	0.60	309	1.00	111	1.40	56.8

$$D.P.H._{60} = \frac{111.24}{d^2}$$

d = diagonal in 1/100 mm.

TABLE II

Diamond Pyramid and Rockwell C Numerals of Tested Standard Blocks

Test Block No.	Type of Metal	D.P.H. Numeral (at 60 kg.) Dial Reading	Diagonal, mm.	Height, mm.	D.P.N.	Rockwell C Hardness
1	Aluminum	46.5	1.485	0.212	50.5	—53.4
2	Copper	54.7	1.005	0.143	110	—32.5
3	Brass	57.0	0.940	0.134	126	—25.6
4	Weld	59.0	0.875	0.125	145	—19.0
5	S.A.E. 1020 steel	59.8	0.880	0.126	144	—14.0
6	Mn-Mo plate	64.0	0.735	0.105	206	1.7
7	Stainless 18-8	66.9	0.725	0.103	203	2.6
8	S.A.E. 1020 c.r.	67.4	0.720	0.103	215	7.1
9	Stainless 18-8	68.3	0.710	0.102	221	11.9
10	Pearl. malleable	68.6	0.705	0.101	224	12.1
11	Pearl. Mn plate	70.8	0.690	0.098	234	18.2
12	S.A.E. 6145 steel	76.4	0.580	0.083	330	35.7
13	S.A.E. 6145	81.6	0.497	0.071	449	50.6
14	High Speed steel	86.9	0.355	0.051	883	66.7

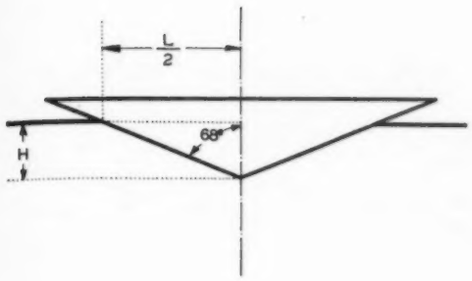
tions are obviously based on determinations of the diameter of the circular impression made in a standard Rockwell test.

The foregoing remarks as to the characteristics of each type of test explain the difference as found by calculating the depth of D.P.H. impression from the actual readings on the Rockwell dial against those determined by dividing the microscopically determined diagonal by seven. The diagram in Fig. 7 shows this clearly. This apparent discrepancy of the test may have some explanation in the quite recently evaluated elastic recovery in the standardized Rockwell test. That this finding has comparatively little bearing on the accuracy of D.P.H. tests with a Rockwell machine shall be shown later. The paper by Howard Scott and T. P. H. Gray on "Relation Between the Rockwell C and Diamond Pyramid Hardness Scales," presented in June, 1939, before the American Society for Metals, would certainly confirm this contention.

Results of Tests

A careful scrutiny of the mentioned papers published this year in the light of work performed during the course of this investigation would indicate that this application of the Rockwell machine has definitely become advantageous to the metallurgical investigator. In summarizing the tests made with soft and very hard materials and presenting these results in graphic form, there is reason to be somewhat amazed at the comparative accuracy of the tests. The mentioned test block, which represented materials of commercial grades, with their inherent and expected variations, indicated, nevertheless, that the general magnitude of the tests is uniform whether a 60, 100, or 150 kg. load be applied upon the pyramid indentor.

Fig. 8 shows that the readings between the Rockwell C hardness and the dial readings during the D.P.H. test have a very clear correlation. This is further borne out by comparing the actual test data obtained with the various materials. Microscopic measurements of all Rockwell as well as D.P.H. indentations check with the expected uniform trend very nicely. The final plotting (Fig. 9) of Rockwell hardness numerals, determined under a 150 kg. load with a standard brale, versus D.P.H. numerals determined with the same machine but by means of the square based pyramid, indicate the real worth of this method. A com-



$$tg\ 68° = \frac{L}{2H}$$

$$2H = \frac{L}{tg\ 68°}$$

$$H = \frac{L}{2\,tg\ 68°}$$

$$H = \frac{D}{2\sqrt{2}\,tg\ 68°}$$

$$H = \frac{D}{7.000573}$$

$$H \cong \frac{D}{7}$$

AT LEFT

FIG. 6—The pyramid hardness may be calculated from the length of the diagonal.

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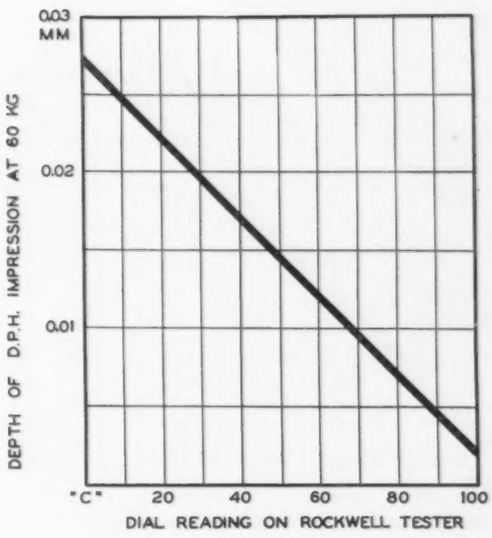
FIG. 7 — Relation between depth of D.P.H. impression and Rockwell dial reading.



parison of the graphical relationship between these two hardness scales shows that they are amazingly close to the most recent conversion tables of Rockwell C and diamond pyramid hardness by Scott and Gray, and are also within experimental error of the conversion tables published by the manufacturer of the Rockwell testing machine.

The somewhat detailed description of results obtained in this investigation seems to indicate that the accuracy of depth measurements of the Rockwell machine lends itself to determining D.P.H. hardness. It would, therefore, be perhaps a very remunerative experiment to design a depth gage which would read directly in D.P.H. numerals without reference to as many scales as the present Rockwell machine has to offer. In addition it would eliminate the use of steel balls of admittedly variable hardness characteristics and variable sizes without the unavoidable inaccuracy of the test. Whether or not the same would be true for superficial Rockwell machines would naturally have to be proved by experiment. Nevertheless, the foregoing experiences are offered mainly for those who are interested in making D.P.H. hardness measurements without the necessary expense of having just another hardness testing machine in their laboratories.

AT RIGHT

FIG. 9—Graphic relationship between the Rockwell C and D.P.H. scales.

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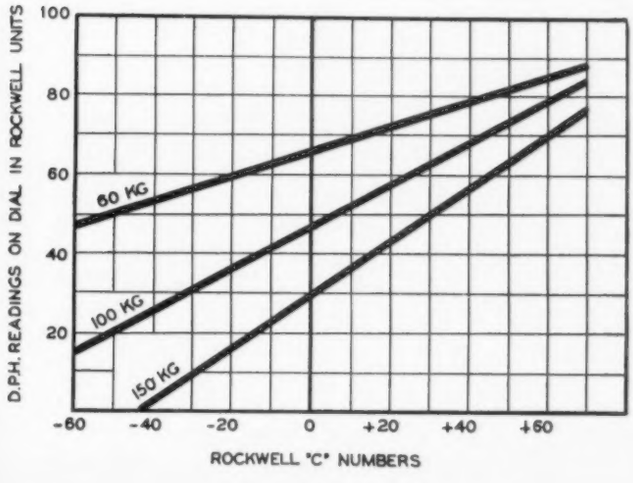
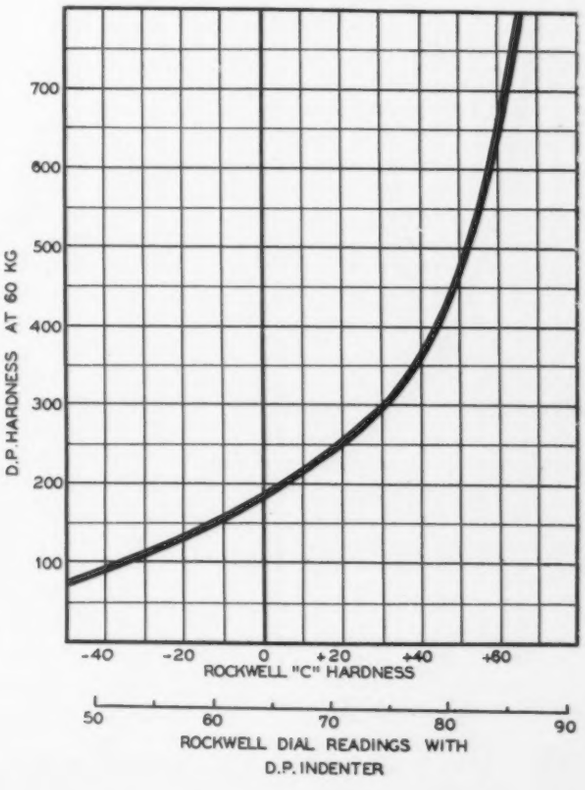
FIG. 8—The readings between the Rockwell C hardness and the dial readings during the D.P.H. test have a very clear correlation.





Flow of

ASTOUNDING progress has been achieved during the past decade in equipment used for the hot and cold working of steel and other metals. During the same period a similarly important, although less spectacular, development has taken place in academic knowledge of the basic principles underlying the flow of metals in the forming operations. However, the commercial processes offer a considerable resistance to any attempt of developing a theoretical foundation due to the interference of numerous factors. Thus, any mechanical treatment of the plastic flow must allow for the effect of these numerous factors, but must be at the same time simple enough not to extend the unavoidable calculations in a specific case beyond the limits of practical usefulness. This paper presents such an attempt to abstract and correlate the present knowledge on the plastic flow of metal—the paper was originally presented at the recent symposium on the Cold Working of Metals sponsored by the Metallurgy Department of the Carnegie Institute of Technology.

o o o

THE complicated relations which control the plastic flow of metals can be determined if it is possible to calculate the stress and the strain produced by the different working processes from a few known fundamental facts and some assumptions. At the present time these processes appear to be too complicated to permit the formation of a general theory which will predict all details, at least not without an enormous amount of calculations.

However, it is possible to follow the effects of a number of factors by utilizing some simple laws and some formulas derived from these laws.

The work expended in any deformation process is consumed for two different functions, to overcome internal friction or the "flow resistance" of the metal and to overcome the external friction.

The flow resistance of the metal depends on several factors which will be discussed in detail. The most important of these factors are:

(1) The general state of stress.
(2) The strain-hardening.
(3) The rate of deformation.
(4) The temperature.

The general stress conditions in a uniformly stressed metallic body are determined by three principal stresses, s_1, s_2, and s_3. A cube can be cut from the body in such a manner that only these principal normal stresses exist on its surfaces, and no shear stress, Fig. 1; s_1 is the highest, s_3 the lowest and s_2 the intermediate principal stress. A generally positive or a tension stress is s_1, and s_3 is a negative or a compression stress.

However, the flow of metals can be expressed in a simpler way, by using a value which corresponds to the maximum shear stress occurring in a material:

$$k = s_1 - s_3 = 2t_{max.}$$

This "flow-stress" k (or the maximum shear stress $t_{max.}$) has been found to be approximately constant in a number of different deformation processes, assuming that the metal is in a definite (strain-hardened) condition.

In the case of pure tension, there is only one principal stress ($s_1 = s_n$) present, whereas $s_2 = s_3 = 0$. In compression, there is also only one principal stress ($s_3 = s_n$) present but negative in direction, while $s_1 = s_2 = 0$. Therefore, when one of these types exists, $k = s_1 - s_3 = s_n$. In other words, the stress required to deform a test bar in tension or compression can be taken as the basic value for any deformation process. Unfortunately, the simple maximum shear theory gives only an approximate value, and under stress conditions, where $s_2 = \frac{1}{2}(s_1 + s_3)$, the flow stress has been found[1] to be $k = 1.15s_n$. Such conditions may occur in rolling, in expanding a tube by internal pressure,[2] and partially in deep drawing.[3]

The practical significance of the shear stress law for this latter process is illustrated in Fig. 2, which represents the strength of the metal during deep drawing under various conditions. The breaking strength of a thin-walled cup drawn with a well rounded-off punch may be more than 10 per cent higher than the tensile strength of the metal, while the lateral pressure of a punch with a sharp radius may cause a heavy walled cup to tear at the bottom from a tension corresponding to less than 70 per cent of the tensile strength. However, this deviation is of minor practical importance and the maximum shear theory with a constant flow stress is sufficiently accurate for most commercial considerations.

Another important generalization can be derived from the same assumptions. The introduction or the removal of a hydrostatic pressure p_h does not alter the flow stress:

$$k = (s_1 + p_h) - (s_3 + p_h) = s_1 - s_3$$

This law can be extended further, as

[1] G. Sachs, *Z. Ver. deut. Ing.*, Vol. 72 (1928), pp. 734-736.

[2] M. Ros and A. Eichinger, Versuche Zur Klaerung der Frage der Bruchgefahr, Zurich, 1926 and 1928.

[3] L. Herrmann and G. Sachs, *Metallwirtschaft*, Vol. 13 (1934), pp. 687-692, 705-710.

Metals

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a hydrostatic pressure does not change the state of strain either. Thus the three processes of stretching (in tension), drawing and extruding a rod are similarly related—also a pure compression:

$$s_1 = s_2 = 0, \qquad s_3 = -k$$

and a two axial tension such as would occur in the bottom of a drawn shell:

$$s_1 = s_2 = k, \qquad s_3 = 0$$

are similarly related and distinguished by a hydrostatic tension k. The flow stress actually increases slightly with increasing hydrostatic pressure, but this can be disregarded for most practical purposes.

The plastic strain in a body can also be described by three principal deformations e_1, e_2, and e_3. If a sphere is cut from the body and deformed to an ellipsoid, the three deformations in the directions of the three axes of the ellipsoid are the principal deformations. Again e_1 is the largest strain and always positive, e_3 the smallest and always negative strain. In the extension of a bar having a length l_o to the length l_1

$$e'_1 = \frac{l_1 - l_o}{l_o} = \frac{}{l_o} - 1$$

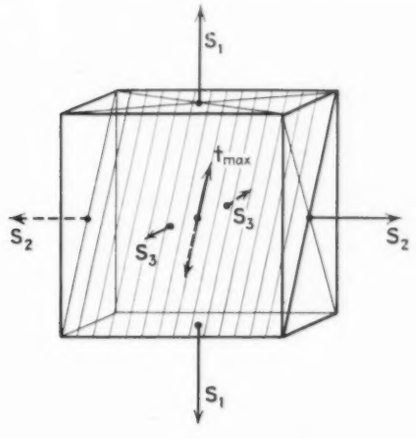
In the case of the compression of a bar having an original height h_o to the height h_1:

$$e''_3 = \frac{h_1 - h_o}{h_o} = -\left(1 - \frac{h_1}{h_o}\right)$$

The directions of the principal deformations are always parallel to the directions of the principal stresses. The amount of the strain in different directions for small deformations is determined by the stresses according to the following equation:

$$\frac{e_1 - e_2}{s_1 - s_2} = \frac{e_2 - e_3}{s_2 - s_3} = \frac{e_3 - e_1}{s_3 - s_1}$$

The strains may be calculated if the stresses are known throughout a forming process. This has been done for the deep drawing (without ironing)



ABOVE

FIG. 1—Principal stresses, S_1, S_2, S_3; and maximum shear stress, t_{max}

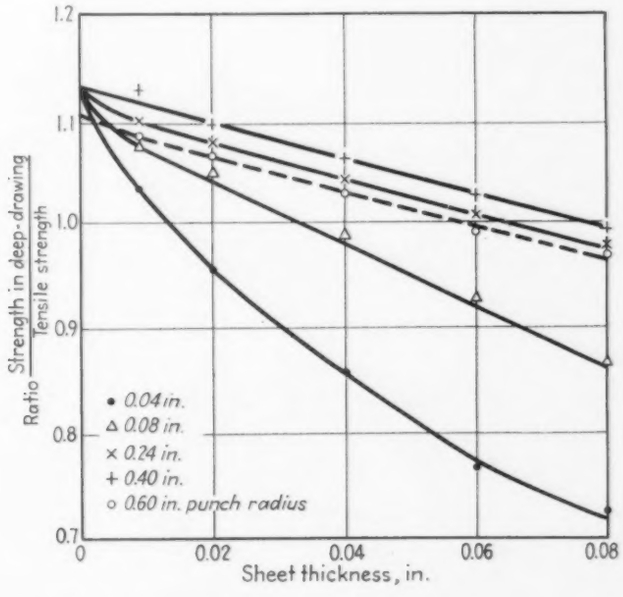


FIG. 2—Strength of cylindrical shells during deep drawing, depending upon the metal thickness and the shape (radius) of the punch. For 67/33 brass. Blank diameter = 2.40 in.; punch diameter = 1.20 in.

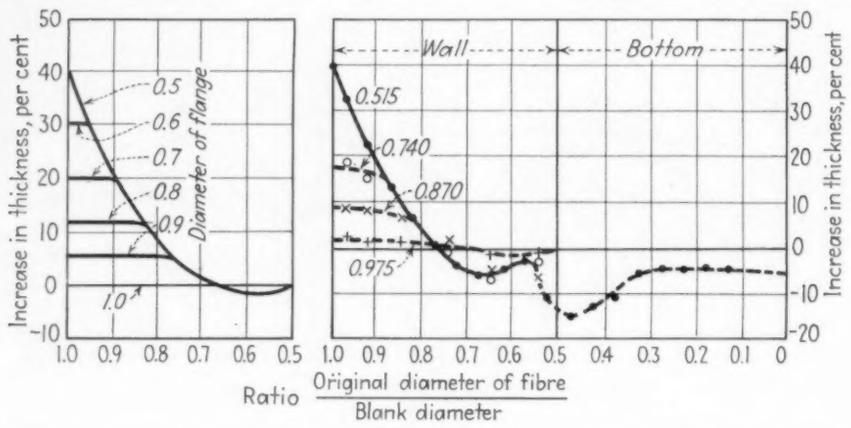


FIG. 3—Strain (increase in thickness) of a blank (aluminum) during deep drawing. Reduction 50 per cent. Calculated (left) and measured (right).

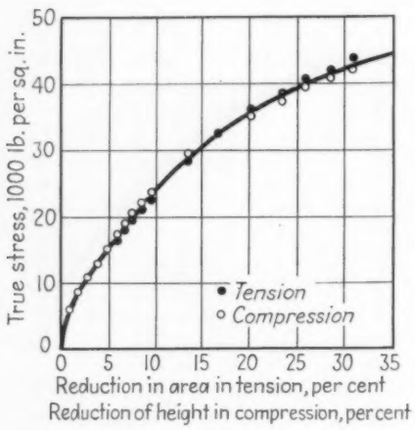


FIG. 4—Strain-hardening of copper in tension and compression.

of a shell having a diameter of twice that of the punch, Fig. 3.[4] The calculated changes in thickness at different locations during the transformation of the blank to the cup closely correspond to the measured ones, showing a 40 per cent increase in thickness at the upper edge and a slight reduction in thickness at the bottom of the shell. The tension stresses created by the punch pressure cause an additional stretching of the bottom and the fillet of the cup.

In the consideration of strain or deformations, a value called the "effective deformation"[5] is of assistance:

$$\epsilon = l_n (1 + e)$$

During plastic deformation the volume of a metal is only slightly altered, perhaps 0.1 to 0.01 per cent, and can be considered as a physical constant. This gives the following equations:

$$V_o = V_1 = V_o(1 + e_1)(1 + e_2)(1 + e_3)$$
$$(1 + e_1)(1 + e_2)(1 + e_3) = 1$$

where:

V_o = volume before deformation
V_1 = volume after deformation

This equation translated to the logarithmic functions results:

$$l_n(1+e_1) + l_n(1+e_2) + l_n(1+e_3) = 0$$

or:

$$\epsilon_1 + \epsilon_2 + \epsilon_3 = 0$$

According to this formula at least one of the three deformations is positive, another is negative, and the third may be either. The single deformation which is equal to the sum of the other two but of a different sign is called the maximum strain ($\epsilon_{max.}$). Its numerical value is in any case the half sum of the absolute values of the individual deformations:

$$|\epsilon|_{max.} = \tfrac{1}{2}(|\epsilon_1| + |\epsilon_2| + |\epsilon_3|)$$

RESISTANCE TO FLOW AND POWER CONSUMPTION: The degree of strain-hardening in a metal produced by different cold deformation processes (at a given temperature) is determined primarily by the amount of deformation, while the effect of the speed of deformation is negligible, as far as practical conditions are concerned. The degree of strain-hardening effected by different processes is governed by Ludwik's laws.[6] The main factor is the amount of the previously

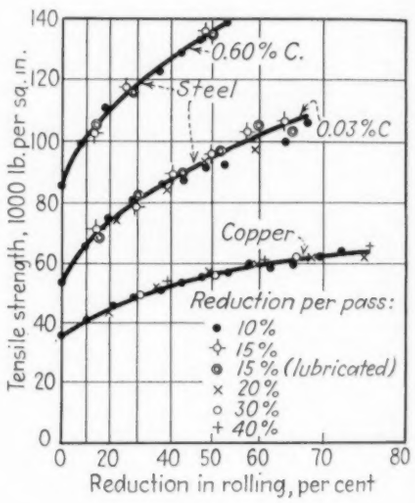


FIG. 5—Tensile strength of rolled steels and copper for different reductions (Siebel).

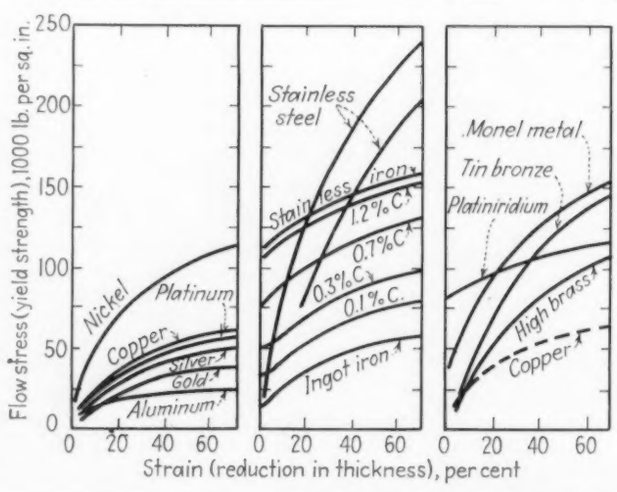


FIG. 6 — Strain-hardening (flow) curves for different metals.

[4] G. Sachs, Spanlose Formung, Berlin, 1930, pp. 33-37.
[5] P. Ludwik, Elemente der Technologischen Mechanik, Berlin, 1909.
G. Sachs, Spanlose Formung, Berlin, 1930.
E. Siebel, *Steel*, Vol. 93 (1933), Nos. 16 to 26; Vol. 94 (1934), Nos. 1 to 19.
[6] P. Ludwik, Elemente der Technologischen Mechanik, Berlin, 1909.
P. Ludwik and R. Scheu, *Stahl u. Eisen*, Vol. 45 (1925), pp. 373-381.
[7] G. Sachs, Spanlose Formung, Berlin, 1930, pp. 43, 66.
[8] H. Unckel, *Journal Institute of Metals* (London), Vol. 61 (1937), pp. 171-196.

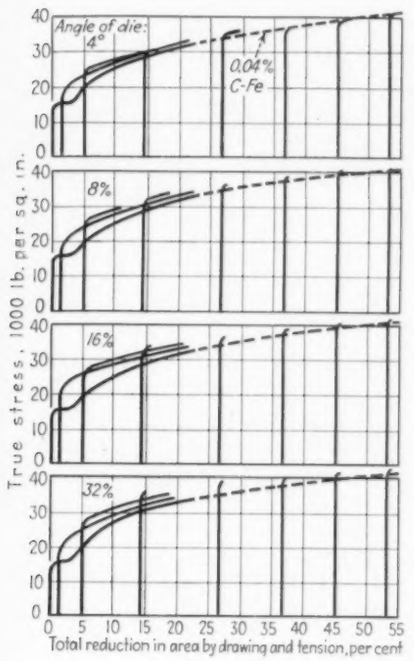


FIG. 7—Stress-strain diagrams for steel wires, drawn from the annealed condition by different reductions and with dies of various shapes.

discussed "maximum strain," disregarding the sign. Therefore, for tension and compression, the degree of strain-hardening will be the same for the same amount of "effective strain":

$$\frac{dl}{l} = -\frac{dh}{h} \text{ or:}$$

$$\epsilon'_1 = \epsilon''_3 = l_n\left(\frac{l_1}{l_o}\right) = l_n\left(\frac{h_o}{h_1}\right)$$

A more convenient form is to compare the two values:

$$\frac{l_o}{l_1} = \frac{h_1}{h_o}$$

$\frac{h_1}{h_o}$ in compression is:

$$\frac{h_1}{h_o} = 1 + \frac{h_1 - h_o}{h_o}$$

and $\frac{l_o}{l_1}$ in tension can be replaced by the reduction in area from f_o to f_1 as the volume remains constant:

$$V = l_o \times f_o = l_1 \times f_1$$

$$\frac{l_o}{l_1} = \frac{f_1}{f_o} = 1 - \frac{f_o - f_1}{f_o}$$

This results in the simple relation:

$$\frac{h_o - h_1}{h_o} = \frac{f_o - f_1}{f_o}$$

In other words, the degree of strain-hardening in tension for a definite reduction in area (in per cent) is identical with the amount of strain-hardening in compression that is effected by the same reduction in height or thickness (in per cent). Fig. 4 shows the results of some experiments with copper, which were initiated to verify this relation.

The equivalent deformations for several working processes on this basis are:

Rolling: Reduction in area, and in addition reduction in thickness for sheet and strip rolling.

Drawing: Reduction in area.

Extrusion: Reduction in area.

Piercing: Reduction in wall thickness.

In complicated forming processes, where the strain varies in the different sections, the quantity and distribution of the strain has to be determined by special investigations.

Strain-hardening curves can be determined by tension and compression tests up to the point where these tests become unreliable because of the effects of necking and friction, respectively. The stresses should be the "true stresses" related to the actual cross-section and not the conventional stresses which refer to the initial cross-section. The further extension of the curves can be obtained from tensile strength measurements of rolled metal, Fig. 5, which approximately correspond to the flow stress for hard tempers. Fig. 6 shows a number of average strain-hardening curves for different metals.

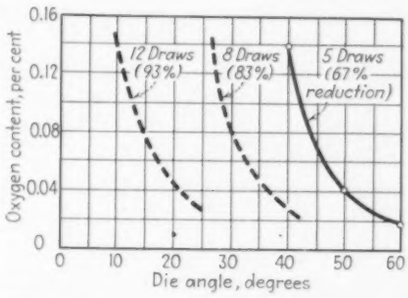


FIG. 8—Ductility (total reduction) of copper wires with various oxygen contents in drawing with different dies (Remmers).

In most commercial operations, and wire drawing[7] in particular, the degree of strain-hardening is generally higher than that derived from the foregoing considerations. This is attributable to a non-uniform flow of the metal, which causes an increased amount of deformation and therefore an increased strain-hardening, compared with an ideal homogeneous deformation, such as in tension. As shown in Fig. 7, this additional strain-hardening varies considerably with the specific drawing conditions, and is very small for a wire reduced by a heavy draw in a low-friction tungsten carbide die having an acute angle. The flow of metal during wire drawing, however, becomes very irregular with an increasing die angle, with a high friction die material, such as steel, and with small reductions. This has been demonstrated both by X-ray investigations and by residual stress determinations. Also, the less uniform the flow of the metal, the greater is the tendency to form defects of any type. Thus, according to Fig. 8, copper wire with a certain oxygen content may be subjected to higher total reductions with acute angle than with wide angle dies.[8]

A very non-uniform flow of metal has been observed in extrusion, which can also be considered as a drawing process with a wide open die. These relations are illustrated schematically in Fig. 9. In other working processes, such as rolling (see Fig. 5), and tube drawing, the flow of metal is comparatively uniform, while on the other hand, such processes as die forging permit a detailed analysis if complete data on the state of strain are desired.

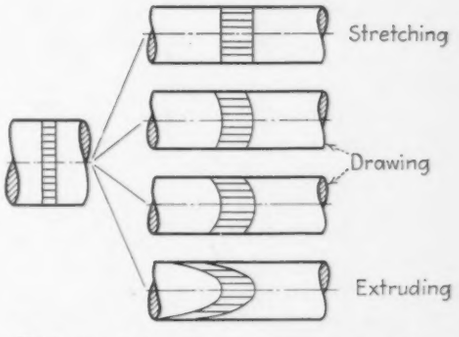


FIG. 9—Schematic representation of the strain in different forming processes, resulting in the same external change of shape.

Ed. Note: Next week the author will conclude this report with data on the path or course of deformation in the different working processes, and the effect of friction and lubrication.

Flame STRENGTHENING

o o o

By J. H. ZIMMERMAN
Development Engineer, Linde Air Products Co., New York

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THESE data are from a paper presented at the recent 20th annual meeting of the American Welding Society. The complete paper on "Flame Treating" includes description of certain of the more recent applications of the flame-hardening process to special shapes requiring unusual control of contour of the hardened zone and to special materials to which the process has been applied only recently with success. The general subject of flame softening was also discussed, with particular reference to the important part played by it in the oxy-acetylene cutting of the hardenable steels.

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Of the three flame-treating processes—flame hardening, flame softening and flame strengthening—flame strengthening is the newest and least known. It is, however, self-defining by name. In application it is practically identical with the flame-hardening treatment. The purpose of flame strengthening differs appreciably, however, in that the intent is to strengthen highly-stressed parts locally in the regions of excessive concentration of stress. An example of such stress concentration, as determined photoelastically, is shown in Fig. 1.

The process is directed particularly at parts which are to be subjected to repeated stresses and which are thus subject to failure by fatigue. In protecting against fatigue failures it is again—to borrow the slogan of a well-known paint manufacturer—a case of "save the surface and you save all." In other words, while the treatment may appear to be identical with flame hardening, it may be applied to sections of a part which will never be subjected to wear, for the specific purpose of increasing mechanical strength as resistance against the formation and propagation of fatigue cracks. By virtue of the extreme flexibility of the process, the use of flame strengthening makes it possible to effect savings in comparison with the complete heat treatments where, in many instances, 100 per cent of a part would be fully hardened and drawn in order to increase the strength of the 1 per cent which may be subjected to the maximum stresses.

As previously stated, there is practically no difference between the flame strengthening procedure and that for flame hardening. In order to produce the desired contours of strengthened metal and in order to control the fadeout of this strengthened section into the base metal in regions of lower stress, and thus prevent sharp discontinuities, it has been found desirable to employ special heating heads where the complexity of the part does not lend itself readily to the use of simple or standard equipment.

The cooling in the flame strengthening process may be somewhat less drastic than in the case of flame hardening. Whereas it is generally agreed that high hardness is indicative of great strength, unfortunately, the strength so indicated is not, in turn, indicative of the maximum fatigue or endurance properties. Somewhat lower than maximum hardnesses have been shown to be advantageous with regard to resistance to repeated stresses. This is probably caused by the need for a certain amount of ductility to provide for minute plastic deformations in regions of high stress concentration. The need for tempering, even though at a low temperature, is even more obvious in the case of flame strengthening than in the case of flame hardening.

Strengthened Parts Tested

While no specific information concerning the performance of flame

* See "Photoelastic Studies in Stress Concentration," by M. M. Frocht, *Mechanical Engineering*, 58, 485 (1936).

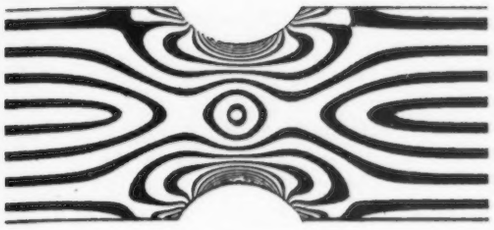


FIG. 1 — Photoelastic study showing stress concentration at shallow grooves in pure bending.

strengthened parts in service is yet available, the results of laboratory tests are of interest. In Fig. 2 is shown part of a sectioned and etched fatigue specimen of the type employed in a series of tests to determine the advantages of the flame-strengthening process. In this specimen a sharp shoulder was intentionally introduced in the mid-section of the test specimen which is submitted to uniform bending during rotation. As is well known, and as has been previously indicated by the photoelastic illustration in Fig. 1, this abrupt change in section is a stress raiser of appreciable magnitude. It was thought that if flame strengthening could divert the fatigue failure from the sharp cornered fillet to the shank of uniform diameter, the treatment, in effect, would have completely eliminated the weakening effect of the stress raiser. This has been found to be the case, as shown by Fig. 2 which is a longitudinal section of a fractured specimen showing the break at the center.

To investigate further the effect of flame strengthening, the entire reduced section surface, as well as the fillets, was strengthened in a second series of specimens. In these tests it was soon found possible to throw the fatigue failures to the untreated metal in the sections of large diameter. Actual dimensions of the specimens under test were 7/16 in. and ½ in. for the small and large diameters respectively. This variation in diameter corresponds to a much greater difference in the induced stress under load, the ratio of stresses for a uniform bending moment being almost 1.5:1.

Future Possibilities

Results of one series of comparative fatigue tests are shown in Fig. 3. The endurance limits for four sets of specimens of the same type but of different treatment are shown. The base material in this series of tests was S.A.E. 1045 steel. No attempt was made to determine the actual endurance limit of the material, which is probably in the neighborhood of 45,000 lb. per sq. in. Instead, the calculated stresses for the test specimens were based on the small diameter without regard to the stress raising factor corresponding to the sharp cornered shoulder.

In the lower curve it will be seen that the nominal endurance limit of the test specimen, untreated, was in the neighborhood of 18,000 lb. per sq. in. If it is assumed that the test material itself has an endurance limit of 45,000 lb. per sq. in., the actual stress raising factor indicated is 2.5, a value which is not inconsistent with published data.*

In the second curve from the bottom, the nominal endurance limit is indicated to be approximately 26,000 lb. per sq. in. This series of specimens was oil-quenched from 1540 deg. F. and drawn at 400 deg. F.

The next curve showing a nominal endurance limit of 32,000 lb. per sq. in. corresponds to the series of specimens treated as indicated in Fig. 2, namely, untreated base metal with flame-strengthened fillets. It is interesting to note that this relatively sparse heat treatment has developed improved fatigue resistance as compared with a fully quenched and drawn specimen, although it must be admitted that the fully hardened specimens would probably have shown improved results had they been water-quenched.

The upper curve, indicating a nominal fatigue limit around 52,000 lb. per sq. in. was obtained in testing a series of specimens which had been flame strengthened not only at the fillets but across the entire reduced section. The improvement is obvious.

The results of these and other laboratory tests in progress indicate that there may be considerable future for the flame-strengthening process.

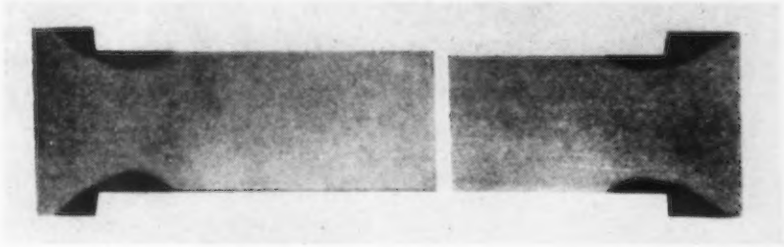


FIG. 2—Macro-etch of failed fatigue test specimen showing flame strengthening at the regions of stress concentration

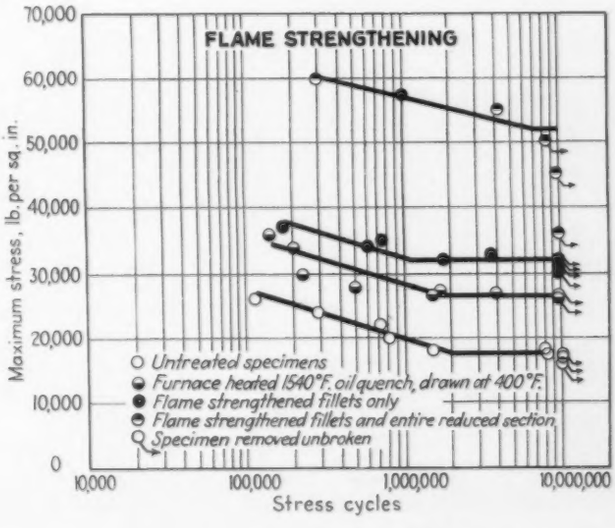


FIG. 3—Graphical representation of fatigue test results, showing determination of endurance limits.

Copper in Cast Iron...

By TOM BARLOW
Engineer, Copper Iron and Steel Development Association, Cleveland

THE following analyses of cast iron are included as typical examples of some of the copper alloy cast irons now being used. These analyses do not begin to cover all the variations which can be utilized with economy but merely serve to illustrate the way in which the unusual characteristics of copper cast iron can be utilized.

I

	Per Cent
Total carbon	3.15 to 3.40
Silicon	1.80 to 2.10
Copper	0.75
Steel	15 to 20

Use—Cylinder blocks

Reason—Increase section uniformity and machineability together with improved wear resistance.

Tensile strength—30,000 to 36,000 lb. per sq. in.

II

Total carbon	3.30 to 3.60
Silicon	1.40 to 1.80
Manganese	1.00 to 1.25
Copper	0.75
Steel	5 to 10

Use—Flywheels, etc.

Reason—Closes the grain without tendency toward cracks or loss in machineability.

Tensile strength—32,000 to 38,000 lb. per sq. in.

III

Total carbon	3.20 to 3.40
Silicon	1.40 to 1.60
Copper	1.25 to 1.75

Use—Gears, etc.

Reason—Density, wear resistance, and machineability, together with improved finish.

Tensile strength—34,000 to 40,000 lb. per sq. in.

IV

Total carbon	3.10 to 3.30
Silicon	1.40 to 1.80
Copper	1.75 to 2.25

Use—Heavy machinery, etc.

Reason—Extreme density combined with good machineability and improved finish. The increased wear due to the copper is frequently a factor in this case also.

Tensile strength—38,000 to 45,000 lb. per sq. in.

The first analysis given is that of the Ford cylinder block and is typical of that used for cylinder blocks by many other manufacturers. In this case 0.75 per cent copper is sufficient to insure the section uniformity and machineability that is desired in these castings. As pointed out in the quotation (last week) from the paper by McCarroll and McCloud[1] of the Ford Motor Co., this iron also has a better wear resistance than that found in the unalloyed irons, but the effect of copper on uniformity throughout the various sections is the prime consideration.

The second analysis given is typical of castings such as flywheels where unusual density is required in a casting having rather drastic changes in section size. It should be noted in this iron that the carbon and manganese are relatively high combined with the fairly low silicon and 0.75 per cent copper to maintain machineability. As pointed out in the paper by McCarroll and McCloud,[1] the same density could be obtained in these castings by the use of a lower silicon content and no copper, but in this case the casting would be difficult to machine as well as being subject to porosity in the heavy sections and cracks in the lighter sections.

The third analysis given is typical of such applications as gears in which good machineability is desired but somewhat greater density and wear resistance are necessary. These castings usually have definite changes in section size and are therefore liable to cracking and porosity unless some alloy such as copper is used to maintain the structural uniformity.

The fourth analysis given is well adapted to heavy castings in which the ability of copper in higher percentages

[1] "Ford Alloy Castings," by R. H. McCarroll and J. L. McCloud, Metal Progress, 1936.

to enhance density combined with good machineability is of prime importance. Unlike most other graphitizers, copper has a very definite tendency to close the grain of large castings, particularly in the higher percentages. The use of this amount of copper is normally accompanied by a substantial increase in the physical properties.

When higher strength, together with good toughness, low chill, extreme density, and good machineability are desired, the use of copper in combination with some other element is frequently the most economical method of obtaining the desired results. A number of such combinations have been investigated and are now being used commercially in increasing amounts. One of the most common of these alloy combinations is that of copper and chromium, of which two examples are as follows:

I

	Per Cent
Total carbon	3.10 to 3.50
Silicon	2.20 to 2.50
Copper	0.80 to 1.20
Chromium	0.25 to 0.50

Use—Pumps, compressors, etc.
Reason—Density, resistance to pressure together with machineability and improved strength.
Tensile strength—30,000 to 40,000 lb. per sq. in.

II

Total carbon	3.15 to 3.40
Silicon	1.80 to 2.10
Copper	1.25 to 1.75
Chromium	0.40 to 0.60

Use—Brake drums, hoist drums, etc.
Reason—Increased wear resistance, thermal stability, and density.
Tensile strength—35,000 to 45,000 lb. per sq. in.

COPPER is becoming an important alloy addition in the gray iron foundry. Detailed data on typical copper alloy irons and their physical properties and applications are presented herein, as well as data on special irons and information on general foundry practice. In the first section of this two-part article, last week, the author described the function of copper as a chill reducer and controller, a pearlite stabilizer, a strengthener and hardener.

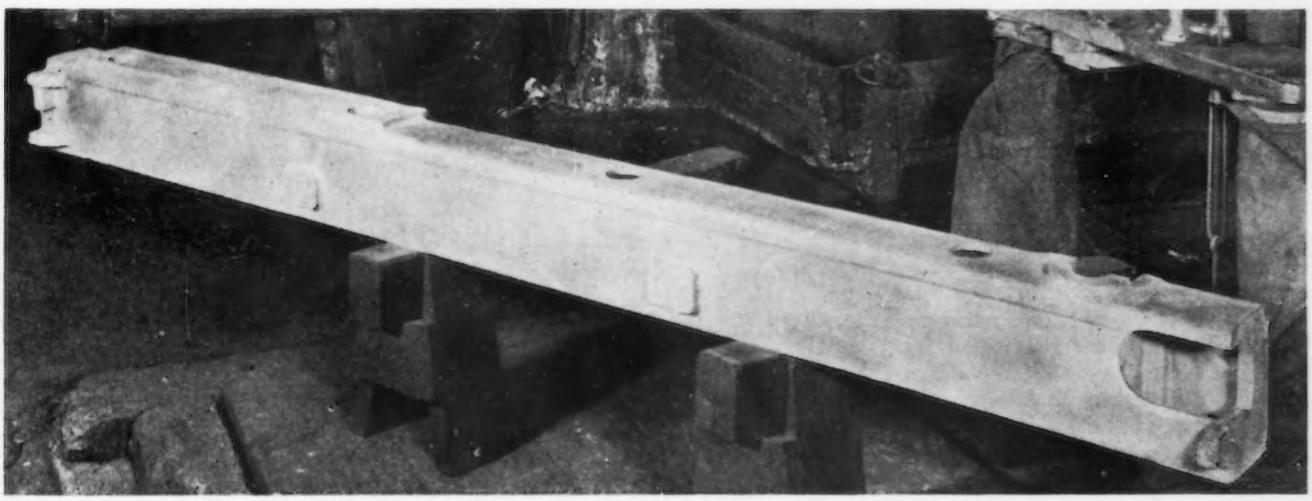
If the degree of chill is to be unaffected, copper and chromium should be added to cast iron in proportions of approximately 4 to 1. Additions of chromium alone strengthen and harden cast iron materially, but render it progressively more brittle and difficult to machine. If, however, they are accompanied by a balanced addition of copper, the strength increases to the same or greater extent but since the formation of free carbide is prevented, the iron remains tough and machineable. When such a combination of chromium and copper is added to a ferritic base iron, the resulting iron tends to be pearlitic because the copper does not accelerate the breakdown of pearlite but merely prevents the formation of carbide due to the addition of chromium. If this same combination, however, is added to a base iron already containing free carbide or hard spots, extra copper would be necessary to break down the original carbide formation in addition to that required to compensate for the carbide formed by the chromium. For the most economical increases in tensile strength and other physical properties, copper-chromium combinations and other alloy combinations should be added to a pearlitic or balanced base iron whenever possible. Among the many applications of copper-chromium irons are brake drums, machine tool castings, valves, and pump castings. One specialized application is in heat resistant castings such as furnace parts.

The first copper-chromium analysis shown is frequently used in such parts as pumps and compressors. It contains an approximately balanced ratio of copper and chromium. This combination permits higher physical properties than would be obtained from the unalloyed irons, together with greater density, resistance to pressure, and equal machineability. In a pump casting the use of this same composition is of importance due to increased corrosion resistance.

The second analysis shown which is typical of small brake drums, hoist drums, and sheaves, contains a somewhat higher percentage of both copper and chromium to promote greater thermal stability and somewhat higher physical properties than could be obtained from the first analysis.

Copper - molybdenum combinations have received favorable comment from

A 3.10 per cent total carbon, 1.60 per cent silicon cast iron machine rail containing 1.50 per cent copper primarily for the purpose of increasing the tensile strength, machineability, and castability. This casting weighs approximately 1200 lb. and showed a tensile strength of 48,000 to 50,000 lb. in sections varying from 5/8 in. to 1 in. Photo courtesy of Bowler Foundry Co., Cleveland.



many users. One application which calls for nearly 10,000 tons per year of copper-molybdenum cast iron in one foundry alone is that of large truck brake drums. This same type iron is also used extensively for crawler crane drums, hoist drums, spill gate valves for corrosive waters, and other applications where high strength, wear resistance, toughness, and even corrosion and heat resistance are required.

I

	Per Cent
Total carbon	3.20 to 3.30
Silicon	1.70 to 2.40
Copper	0.75 to 1.25
Molybdenum	0.40 to 0.60

Use—Brake drums, hoist drums, etc.

Reason—Excellent wear resistance, thermal stability, strength, and machineability.

Tensile strength—40,000 to 50,000 lb. per sq. in.

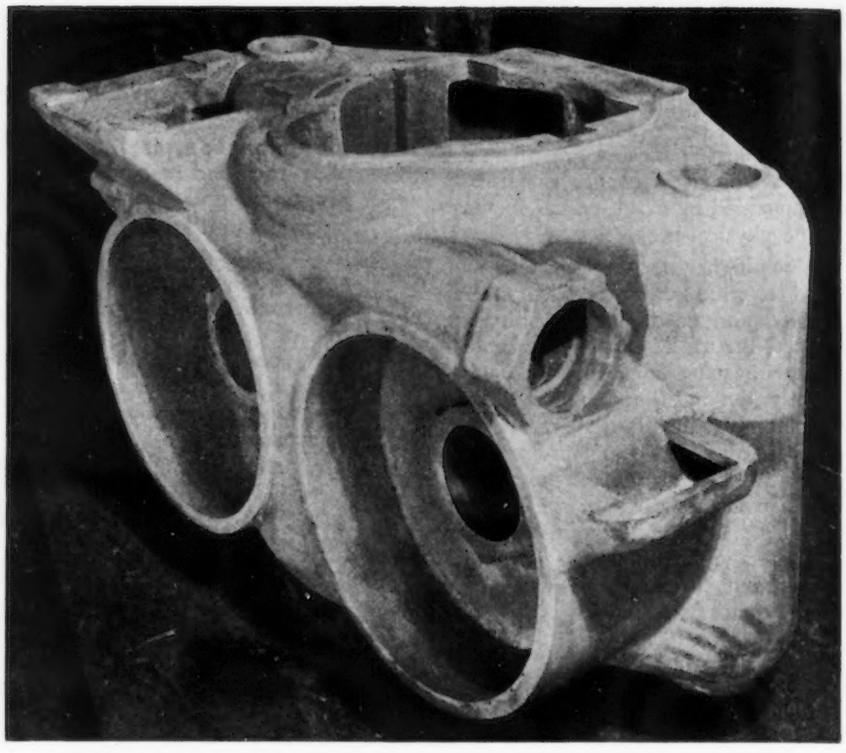
II

Total carbon	2.80 to 3.10
Silicon	1.90 to 2.60
Manganese	0.80 to 1.25
Copper	1.75 to 2.00
Molybdenum	0.50 to 1.10

Use—Diesel cylinders, heavy truck cylinder blocks, etc.

Reason—High strength, wear resistance, density, combined with good machineability and finish.

Tensile strength—50,000 to 80,000 lb. per sq. in.



MEDIUM carbon 1.50 per cent silicon cast iron steam cylinder containing 1 per cent copper for the purpose of increasing tensile and transverse strengths, density, machineability, and corrosion resistance. The casting weighed approximately 1800 lb. and showed a tensile strength of 45,000 lb. per sq. in. in a 3/4-in. section. Photo courtesy of Bowler Foundry Co., Cleveland.

If the chill depth is to remain constant, copper and molybdenum should be added to the cast iron in approximately equal proportions, the exact ratio depending somewhat on the carbon content. However, in copper-molybdenum combinations, the copper acts to increase the strength and for economy's sake is usually added in more than equal proportions. Unlike the copper-chromium combination, copper tends to increase the Brinell hardness in the molybdenum irons when added in excess of 1 per cent. This combination permits very high strength, toughness, hardness, and wear resistance combined with good machineability.

One of the strongest cast iron combinations in commercial use today is that shown in the second copper-molybdenum analysis. This cast iron is used for very heavy Diesel cylinder blocks and similar applications where extreme strength combined with very good wear resistance, density, and satisfactory machineability are of prime importance. This combination of alloys is used commercially in castings showing tensile strengths of up to 80,000 lb. per sq. in. with a machineable Brinell hardness of below 300.

Another alloying combination which is rapidly coming to the front is that of vanadium and copper, of which a typical analysis is as follows:

	Per Cent
Total carbon	3.10 to 3.25
Silicon	1.80 to 2.20
Copper	1.75
Vanadium	0.25 to 0.35

Use—Brake drums, metal molds, stator blocks, liners, etc.

Reason—High strength, section uniformity, wear resistance, and unusual response to heat treatment.

Tensile strength—45,000 to 60,000 lb. per sq. in.

For any given hardness, a combination of 2 per cent copper with 0.15 to 0.20 per cent vanadium gives an increase of from 5000 to 15,000 lb. per sq. in. more than a straight vanadium iron. In other words, higher strengths are obtained with the same Brinell hardness with a copper-vanadium iron than with either straight copper or straight vanadium. These irons have excellent properties in respect to chill, microstructure, and physical properties. They have been used for brake drums, and are beginning to be used for molds to receive hot metal. The copper-vanadium combination has two important characteristics. The first of these is the ability of this combination to respond to heat treatment. Such castings as stator housings, which must withstand excessive wear and should therefore have a very high Brinell hardness but which must be machined, can readily be cast with this combination of alloys to a machineable Brinell hardness and then readily heat treated by a quench-draw treatment to the desired structure. Another characteristic of the copper vanadium combination is the unusual uniformity of structure and properties in castings of various sections and castings from different heats. This combination is frequently recommended where the ability to reproduce the same properties from day to day is important and where uniformity of section structure is required.

Another alloy combination that has received considerable attention in recent years is that of copper and nickel. Data obtained both in experimental foundries and in commercial foundries indicate that copper and nickel are very similar in their effect on Brinell hardness, tensile strength, and other physical properties of cast iron. However, there are certain essential differences between these alloys which frequently make the combination of the two desirable. The following analysis of a typical nickel-copper cast iron is

well known in commercial practice at the present time:

	Per Cent
Total carbon	3.20 to 3.60
Silicon	1.80 to 2.00
Copper	0.75 to 1.00
Nickel	0.75 to 1.00

Use—General machinery.
Reason — Increased density, uniformity, and improved surface.
Tensile strength—30,000 to 38,000 lb. per sq. in.

The solubility of copper in cast iron is limited but can be increased by the addition of nickel. For example, in the absence of other alloys, the amount of copper that can be satisfactorily dissolved in cast iron ranges from 2.5 to 4 per cent, depending somewhat on the composition and somewhat on the section size and cooling rate of the casting involved. However, when large amounts of nickel are added, the solubility of copper in cast iron can be increased to as much as 7 per cent. Therefore, in applications requiring large amounts of an alloying element such as copper or nickel, a combination of half nickel, half copper, or in the higher percentages, two-thirds nickel, one-third copper, is utilized to insure good distribution of the alloy and complete solution of the copper.

For this same reason, combinations of copper-nickel-chromium, copper-nickel-molybdenum, copper-nickel vanadium, etc., are frequently used in the highly alloyed cast irons.

Special Copper Cast Irons

Copper is frequently used in cast iron for special purposes, particularly heat and corrosion resistance. One of the better known corrosion resistant materials containing from 14 to 18 per cent nickel with from 4 to 7 per cent copper is unusually resistant to such corrosive mediums as brine, sea water, ordinary atmospheres, and many chemicals. Due to its unusual toughness and heat resistance, it also finds many applications for such purposes as cylinder liners, sleeves, and grates. Copper is used in this particular alloy combination largely for the purpose of decreasing the cost and increasing the corrosion resistance in some media.

Another fairly well known corrosion resistance application is that of copper cast iron pipe containing from 0.75 to 1.50 per cent copper, which is used particularly in condenser coils for oil refineries, mine water applications, and for acid resistance. Corrosion resistant properties of copper cast iron are also taken advantage of in large spill gate valves and similar castings used in highly corrosive waters, such as would be encountered on the Monongahela River. These castings frequently utilize copper-molybdenum combinations to take advantage of the additional strength and density imparted by molybdenum.

Copper is finding increasing use in heat resistance applications, particularly in combination with chromium. For these applications copper is effective in reducing scale formations at high temperatures and counteracting the embrittling effect of the chromium. A typical cast iron in this class would contain approximately 1 per cent copper and 1 per cent chromium.

A new complex alloy cast iron utilizing the effect of copper on the transformation rates is that containing 3 to 4 per cent copper, 1 to 2 per cent manganese, and 0.5 to 1 per cent molybdenum. This material has an as-cast hardness of between 400 to 600 Brinell even in large sections, but it can be annealed for machining purposes and then rehardened to its original as-cast condition. When cast against a chill, the extreme hardness of the white iron combined with good toughness renders this material suitable for resistance to excessive wear. This material is adaptable to liners, pistons, rings, and chill or grain rolls.

No discussion of special copper cast irons would be complete without mention of the development work done by the Meehanite Research Institute on the use of copper in Meehanite metal. Although the use of copper in Meehanite is probably not directly comparable to the use of copper in gray cast iron made by ordinary means, many of the applications developed by this company are of considerable interest. The Meehanite Research Institute has found that the use of copper in Meehanite metal permits higher hardness, greater strength, better wear resistance, together with good machineability. There are also numerous applications of heat resistant Meehanite utilizing the benefits and economies of copper as an alloying element.

Foundry Practice

The use of copper in the foundry is very simple if a few precautions which apply to any alloy addition are observed. Care must be exercised to keep the copper content below 2.5 to 3.5 per cent unless a specific application calls for some free copper in the iron or unless a large amount of nickel is present as in the case of Ni-Resist. Copper has a melting temperature of 1981 deg. F. and therefore does not cause the blows, shrinks, and other defects that sometimes result from the use of an alloy with a higher melting point than that of cast iron.

Copper is slightly heavier than iron and consequently does not float on the top of the molten bath before being absorbed. Conversely, it should not be added to the bottom of the ladle before the molten iron is added since it will not rise and be absorbed. Probably the most successful method of adding copper to cast iron is to introduce it into the spout of the cupola by means of a funnel or scoop. Another method which is used particularly in smaller ladles poured from a large bull ladle consists of introducing the copper at the base of the stream of iron after the bottom of the ladle has been covered with molten metal. If this is done, the consequent agitation is sufficient to insure good mixing. No difficulty is had in obtaining good solution or dispersion of the copper in the

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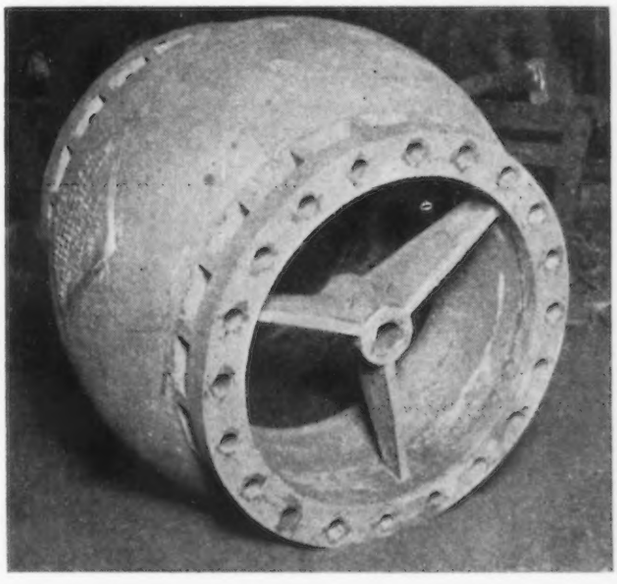

LARGE check valve body containing from 0.5 to 1 per cent copper for the purpose of increasing machineability, corrosion resistance, and improving the machine finish. Photo courtesy of Meehanite Metal Corp.

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Mirror Strip with

THE production and application of specialty steels have increased quite considerably in the past few years, especially in the mirror finish strip steel field.

Part of this increased demand for mirror finish has been brought about by requirements for subsequent nickel or other non-ferrous plating. In the case of stainless or alloy strip, the finish has been obtained by strip buffing or polishing or by extra care in the grinding and polishing of work rolls, coupled with a greater frequency in roll changing.

A partial list of products made from mirror finish strip steel follows:

> **Automobile trimmings, book binders, buttons and buckles, chafing dishes, clock and watch cases, electric irons, electric toasters, decorative trim, jewelry, kitchen ware, manicure files, mirrors, moulding, name plates, pen and pencil clips, smoking sets, soap dishes and vanity cases.**

The Cold Metal Process Co., Youngstown, after several years of research, has developed a method of producing a mirror finish on either carbon or stainless and alloy strip which has resulted in excellent success as regards strip speed.

By combining the use of a hard, dense tungsten carbide work roll with improvements in its cold Steckel mill (Fig. 1) and its operations, it has been possible to obtain speeds up to 2500 ft. per min. on carbon steels and from 1500 to 2000 ft. per min. on stainless steels. These performances, especially the latter, are, in the opinion of Cold Metal, far superior to those obtained heretofore and should result in an even wider application of such specialty steels.

Important factor in this newly developed cold rolling practice is the tungsten carbide work roll (Fig. 2), made by Metal Carbides, Inc., Youngstown. The carbide rolls rank next to the diamond in hardness, and because of their density, composition and structure, they take a mirror-like polish which is transferred to the strip during the cold rolling, thus giving a high luster which is said to be superior to that obtained by Cold Metal heretofore with the use of alloy or carbon steel rolls.

The development of this small work roll was the result of several years of research and necessitated a completely new method of roll grinding. The company states that after each regrind the rolls may be used at least 25 times as long as alloy rolls doing the same work and still retain a good finish. When worn down to a minimum usable roll diameter, the carbide material, of course, is salvaged and used again in new rolls which are obtainable in various diameters and lengths. This work of reconditioning the roll and bringing it up to its original diameter, is said to be relatively inexpensive as compared with the initial cost of a new roll. No details are obtainable from the roll manufacturer on the actual production of the rolls, but it is said that new methods are used and, from a manufacturing standpoint, there seems to be no limit to the diameter and length of roll which can be produced, it being merely a question of having equipment of suitable size.

Following considerable research and expenditure of money in the development of a new roll grinding technique for the carbide rolls, the process now being used involves diamond wheels and special bonds. Several different wheels of varying characteristics are utilized to produce the finish desired, the number of wheels used depending upon the fineness of the finish. The grinding time required is substantially the same as that for putting a high finish on alloy steel rolls. Cold Metal has found that the cost of grinding will not run any higher than the cost of grinding steel rolls which are used for producing high-finish strip, but it is pointed out that suitable grinding equipment must be available and must be kept in tip-top condition to do the proper work.

Because it is practical to roll with a very small diameter work roll in this mill, initial cost of producing the tungsten carbide roll is, of course, lower than if it were necessary to furnish large carbide rolls. Since tungsten carbide has approximately double the modulus of elasticity of steel, there is only about one-half the flattening effect under pressure on the roll that Cold Metal obtains when working with steel rolls. This becomes an important factor in processing thin strip and it has been found that with all other conditions being equal, the use of carbide rolls has enabled the operator to roll strip to about half the thickness than when using steel rolls.

It has been found that the carbide roll may be used for the rolling of ordinary finished strip as well as mirror finish, such use, of course, extending the life of the roll. While originally intended to be used as finishing rolls only, carbide rolls have shown some surprising performances according to Cold Metal on breakdown rolling. To obtain the best mirror finish strip, the company has found it desirable to do the breakdown rolling as well as the finish rolling with carbide rolls, and in this connection it is interesting to note that tungsten carbide has about one-tenth the coefficient of expansion of that of alloy steel.

Orders for high-finish strip usually do not involve large quantities of one size, hence up to the present time carbide rolls have not been given a test of sufficient duration to determine exactly how long they may be used without the necessity for regrinding. The company has found that from 60 to 70 coils can be rolled without regrinding but points out that it may be possible to use the rolls for a longer period as the size of the orders increases. The company reports that one pair of carbide rolls, which was used for breaking down hot rolled strip to various

CARBIDE ROLLS

BY T. C. CAMPBELL
PITTSBURGH EDITOR
THE IRON AGE

gages, performed on a total of 800 coils without regrinding. The material so broken down included low carbon strip, high carbon strip and stainless strip of the chrome nickel analysis.

While seeking this method of producing mirror finish on strip steels, Cold Metal has made a few changes in its cold mill as well as in its cold mill operations. For one thing, emphasis has been placed on the proper use of back tension in the strip as it enters the mill, sufficient back tension causing the strip to enter the mill flat. Fig. 3 shows the method of placing an empty reel into position in the mill after the full reel has been removed and presents a good view of the hydraulic brakes for maintaining back tension in the strip.

These hydraulic brakes are located on the two drive shafts and, because of their small size and weight, their momentum has been brought down to such low factors that the inertia becomes a negligible quantity. On a mill of the reversing type this eliminates variations in strip tension and consequent changes in gage. The improvement in this part of the mill equipment has accomplished quicker deceleration, reversal, and acceleration.

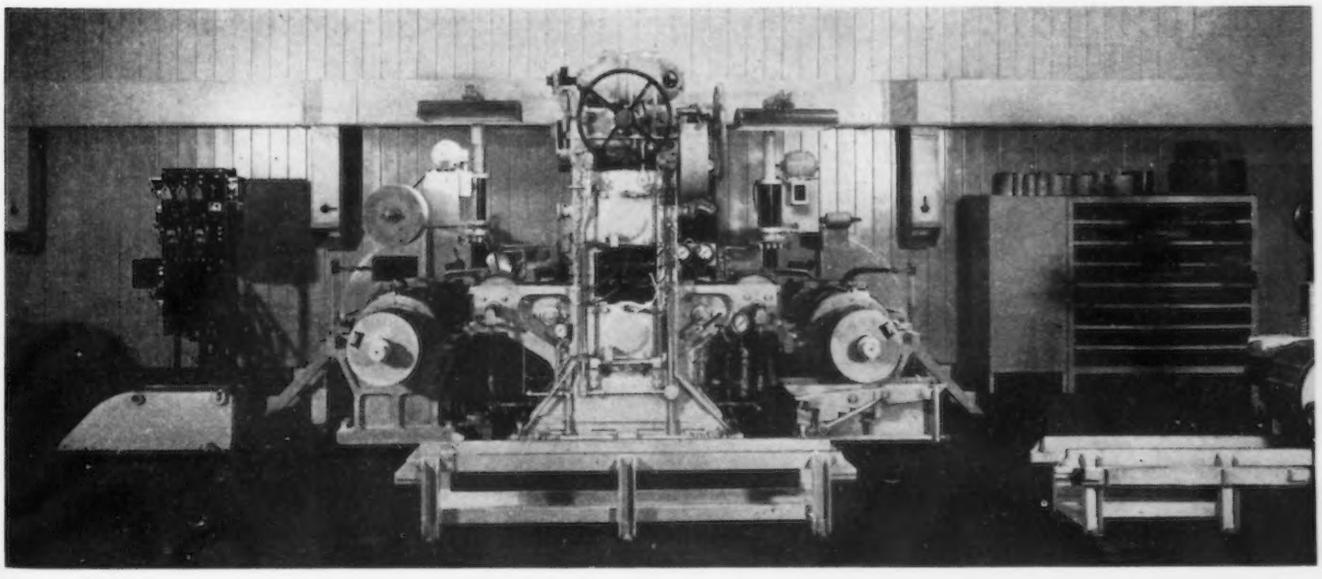
Such progress toward instantaneous deceleration from rolling speed, reversal, and acceleration up to running rolling speed, has made for high efficiency in the production of high-luster strip.

Considerable time and effort was spent in selecting a suitable paper to be wound on the reels between the layers of strip when a very high finish is required. Improvements in uncoiling and coiling this paper have made it possible, when rolling with paper, to obtain speeds of over 2000 ft. a min. on carbon steels and over 1500 ft. a min. on stainless steels. These speeds of course are obtained during the final passes and the company has found that it is advantageous to use paper during most of the finishing passes, thus preventing scratching and preserving the high luster imparted to the strip by carbide rolls. Of interest is the fact that this paper has been coming from Finland but it is understood a move is under way to produce material of identical quality in this country.

The paper machines used are automatic machines and are reversible, and through the use of these machines it is possible to use the paper over a greater number of times. The cost of paper when rolling high finished strip and stainless strip amounts to a substantial item so that these paper machines are of considerable benefit from an economy standpoint.

The mirror finish mill described in this article has been located in an air-conditioned room 33x65 ft. with a 14-ft. ceiling. This is large enough to allow floor space for coil storage and auxiliary apparatus. The room is especially well lighted and an unusual arrangement of lighting was installed so that the operators would have the best opportunity to observe the strip during the rolling processes and thus secure

FIG. 1—A Cold Metal 7-in. cold strip demonstration mill with the gear case in the background, the main drive motor being out of sight. The room is air conditioned.



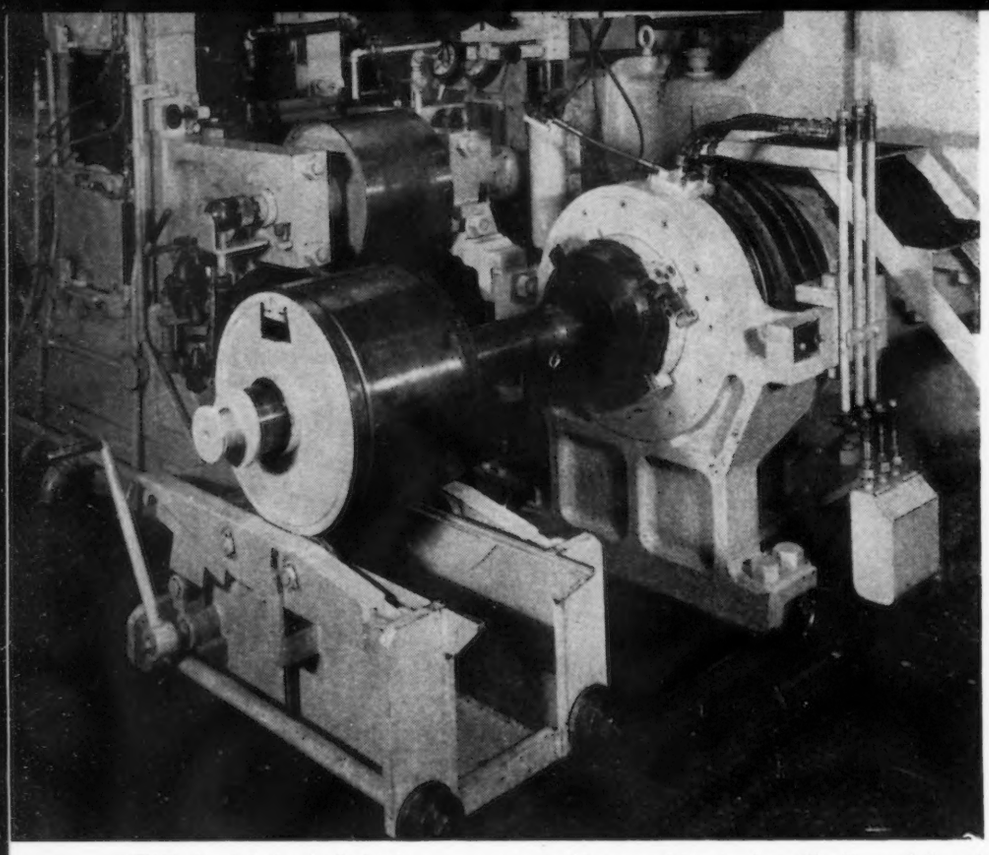


FIG. 3—Method of placing an empty reel into position in the mill after a full reel has been removed. Note the hydraulic brakes for maintaining back tension in the strip.

the best results and readily see any surface defects.

A total of 15 lamp units were used, each unit including one 250-watt mercury vapor lamp and one 300-watt mazda lamp to furnish the general lighting. These lamps are mounted in pairs. In addition to the lamp units, six 20-watt fluorescent lights are located on the mill to furnish the additional light that is desirable directly on the mirror finish strip.

Provision has been made on the mill for rolling either with soluble oil or mineral oil, depending upon the finish desired. As in the regular Steckel mill, splash gates are provided to return the roll oil to the bed plate from which it is returned to the oil purifier system.

The air conditioning of this mill room was developed to keep down the amount of dirt and metallic particles which find their way into the fluid used as the coolant. This condition is kept in control, however, primarily by the use of a special line of oil purifying equipment known as the McBain precipitator and likewise a system has been developed for the handling and purification of soluble oil.

This mill can be switched from all mineral oil to soluble oil or vice versa by throwing a single switch. By keeping the carbon and metallic content in the rolling medium as low as possible, a higher luster than would otherwise be possible is obtained. McBain, chief engineer of Cold Metal, some time ago developed a quick oil tester which consists of an inverted triangle lined on both sides with glass and properly calibrated. It takes only a minute to fill this triangular cup, hold a flashlight in front of one glass and move it up and down until a position where the light disappears is seen through the other glass. By taking off a reading at this point, the efficiency of the oil purifying system can be determined instantly.

By the use of an improved Cold Metal Process Co. gager which indicates the strip thickness at any speed, the company claims it is possible to produce strip that is accurate to gage within a tolerance of plus or minus 2½ per cent of the specified thickness.

Coil counters are used to give the operator the number of wraps of strip that are on each reel. This is of value to the operator for decelerating his mill in the shortest possible time just prior to reversing the mill when the end of the coil is reached.

When a coil of strip has been finished, the coil and its detachable reel upon which it is coiled are removed and are transferred to a separate unloading stand for recoiling. The unloading recoiler is equipped to recoil the strip with any degree of tightness desired. This ranges from the loose strip coils suitable for pot anneal to tightly wound coils ready for shipment or shearing.

Summing up the results obtained by this new rolling practice, Cold Metal has rolled ordinary strip at speeds ranging up to 2500 ft. a min., mirror finished carbon strip with paper at speeds up to 2000 ft. a min., and has rolled stainless steel to a high luster finish at between 1500 to 2000 ft. a min. without discoloring the surface. After rolling with carbide rolls, the surface of some strip was checked with a profilometer and showed a maximum surface variation of 0.000003 in., which is said to be approximately one-half of that obtained by Cold Metal with the use of alloy rolls. The carbide rolls themselves when checked with the profilometer showed a variation of less than 0.0000006 in. The company has also rolled 18-8 stainless steel down to a thickness of 0.001 inch with the use of carbide rolls.

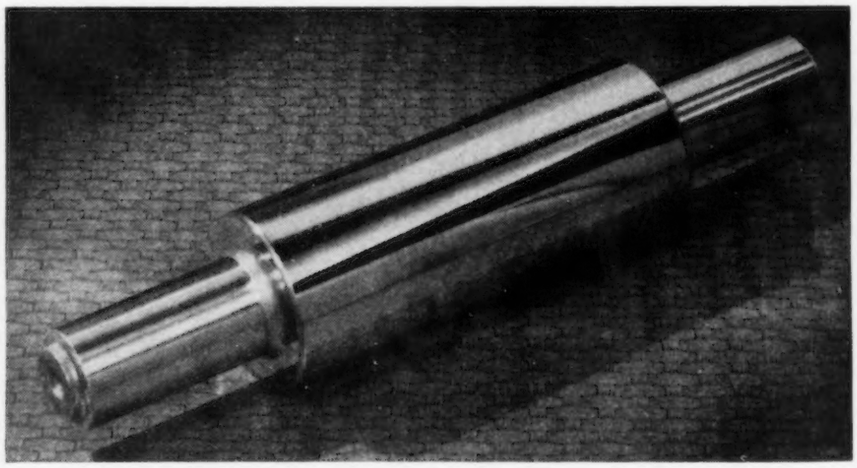


FIG. 2—Tungsten carbide roll showing the exceptionally high finish attained after proper grinding. A mirror finish is produced on either carbon or stainless and alloy strip.

HIGH TIN BRONZES

THE alloys of tin and copper may be divided into two classes, in the first of which the tin is partly dissolved in the copper and partly present in the form of crystals of a tin-copper compound, and in the second, the entire tin content is in solid solution in the copper. The first type, although it provides a metal with a valuable combination of strength and toughness, allied to good resistance to corrosion, is suitable for use in the cast form only. The second type of alloy can, however, be hot stamped and forged or cold rolled or drawn, and is used in the form of rods, tubes, strips, wire, etc. According to the International Tin Research and Development Council, the upper limit of the tin content of this latter quality of bronze was until recently about 5 to 7 per cent and no little skill was required to control not only the casting but the preliminary heat treatment.

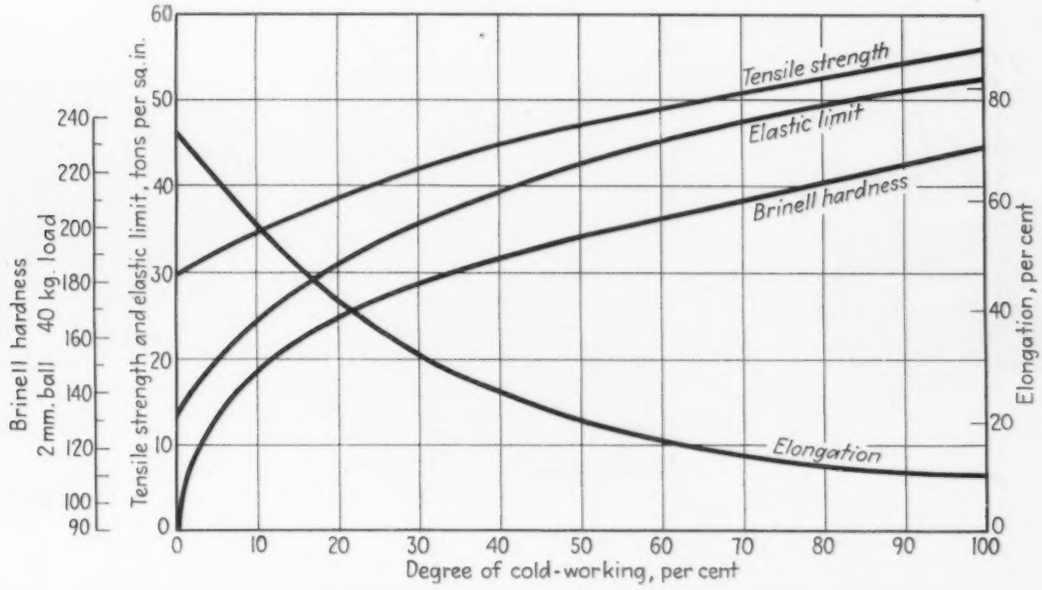
Recent developments have arisen through a fuller appreciation of the part played by absorbed gases in limiting the amount of tin which the copper can carry in solid solution. As a result of research by many workers, two improved methods of degasification of the molten metal have been developed.

The first of these, which is primarily mechanical, is based on the fact that if suitably prepared metal is cast centrifugally, much of the gas content is expelled, and a considerably greater quantity of tin can be got into solution. The machine designed by John Holroyd & Co. Ltd., of Rochdale (England), which employs this principle, is successfully used in the production of hollow billets of high tin bronze suitable for the production of tubes, pinion blanks, and other products.

The second method of production is perhaps more fundamental, as it involves very complete degasification of the molten metal by treatment with one or more special slagging agents after melting and before pouring. An interesting example of a degasification process which is successful under industrial conditions, is that of Dr. Lepp (British Patent No. 436,204), in which the metal, having been melted under slightly reducing conditions, is first treated with an oxidizing and then with a reducing slag. In this way, alloys of 10, 12, and 14 per cent have been made in which the tin can be got entirely into solid solution, and which are readily malleable both hot and cold.

These may be described as virtually new alloys, as the tin present develops properties of corrosion-resistance and strength in a degree not hitherto available in industrial bronzes. The accompanying diagram shows the properties of a 10 per cent tin bronze. Slightly higher figures can be got from the 12 and 14 per cent bronzes, and the most suitable alloy for industrial use is not yet determined.

As an example of the physical properties, consider the 50 per cent cold-worked 10 per cent bronze metal: Ultimate strength of 107,520 lb. per sq. in.; elastic limit of 98,560 lb. per sq. in.; and elongation of 20 per cent. As the corrosion resisting qualities of these new bronzes are equally improved, the alloy will be particularly useful for many parts of machinery which must withstand both stresses and corrosive attack.



The mechanical properties of a 10 per cent tin bronze.

WHAT'S NEW IN MOTORS

BY combining an eddy current clutch and a standard constant speed squirrel cage motor, the *Louis Allis Co.*, Milwaukee, has incorporated in its new Ajusto-Spede motor advantages and economies heretofore not available in a.c. adjustable speed units. Any speed from zero to synchronous speed with normal squirrel cage rotor slip can be obtained, gradual or quick acceleration of load is possible, and rapid intermittent starting and disconnecting of the load is not detrimental since the unit absorbs tortional impulses and vibrations. The unit can be operated continually at low speed without overheating since the efficiency is high. It is suited for a wide variety of industrial drives.

The outer shell of the eddy current clutch is bolted to the quill on which the constant speed motor rotor is mounted and the inner clutch member is keyed to the output shaft, co-axial with the rotor quill. Any desired amount of slip can be obtained in the clutch by controlling its excitation. A new type of pole construction is used whereby intense flux saturation is obtained at the pole ends with the result that the torque developed between the driven and driving members is constant at all amounts of slip. Power required for excitation of the clutch is small, and remote control is practical. The rheostat for controlling output speed is separately mounted. In motors of 30 hp. and under, a small stepdown transformer and rectifier are available as a source of d.c. excitation.

LATEST idea in variable speed a.c. motors is the Louis Allis Ajusto-Spede motor, which combines a standard squirrel cage motor with an eddy current clutch. By varying the clutch excitation, infinite variations in speed from 0 to 1700 r.p.m. are available. Rated up to 30 hp., these motors are for application where slip speed control, intermittent service, gradual or rapid acceleration of load, shock absorption or quick load release are desired.

THE latest design in variable speed a.c. motors combines a squirrel cage motor with an eddy current slip clutch. Improvements continue in totally inclosed, fan cooled motors. Other electrical apparatus for the industrial plant included in the current review of recent announcements are capacitors for power factor correction, air cooled transformers, circuit breakers, time-delay starters, new types of mercury switches, micro switches and photoelectric controls for limit switch work and for counting and sorting.

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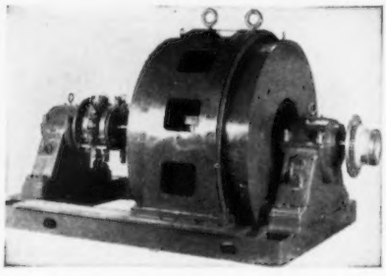
Large Size Wound Rotor Motors

OF special sturdy construction to withstand hard service on metal rolling mills, hoists and similar applications, newly designed pedestal-type wound-rotor induction motors in 250 to 5000-hp. sizes are announced by the *Westinghouse Electric & Mfg. Co.* The motors are built to withstand conditions where high starting torque, frequent starts and stops, reversing service and abnormally high peaks are common requirements.

Necessary strength and rigidity of the stator are obtained through a box-type cast-iron frame or a fabricated steel frame, with supporting feet near the horizontal center line of the frame. The feet have horizontal and vertical adjustment, so the stator can be lined up to compensate for bearing wear.



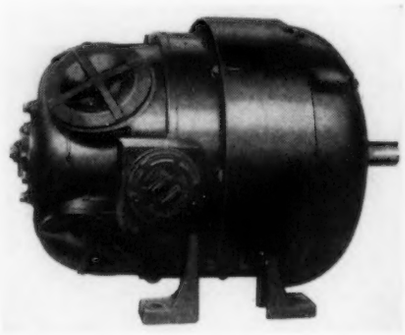
WESTINGHOUSE heavy duty wound rotor motor for rolling mill, hoist and similar application. The entire base of each pedestal forms lubricant reservoir for the ring oiled bearings.

All bearings are lined with babbitt and are oil ring lubricated.

To withstand electrical strains the rotor coils are insulated for double voltage. Partially-closed slots and form-wound coils similar to those used in fully-open slot construction are built in. The rotor coils are made of two straps side by side, completely insulated before assembly. This construction gives a high power factor without the disadvantage of a small mechanical air gap.

Motor-Generator Sets

SAVING in floor space, accessibility, and the use of machines of different speeds are outstanding features of a new pyramid-mounted arrangement of three-machine motor-generator sets developed at the Norwood, Ohio, works of *Allis-Chalmers Mfg. Co.* The generator, motor and exciter are assembled one above the other, thus requiring floor space equal only to the generator mounting dimensions. On top of the generator is placed the induction motor, securely attached with suitable base plate, and the exciter in like manner is mounted on top of the motor. The generator and exciter are driven by Texrope V-belts from the motor shaft, adjustment being provided in the motor and exciter base plates. Motor-generator sets of this type are at present available in sizes up to and including 10 kw.



THE Reliance Electric & Engineering Co., Cleveland, is now prepared to build explosion-proof d.c. motors in a complete range of sizes from 1 to 75 hp. The inclosed, fan cooled design, with ball bearings, has heretofore been built only in the smaller horsepowers. These motors are approved by the Underwriters' Laboratories, Inc., for Class I Group D hazardous locations, such as in the presence of vapors of benzene, alcohol, **pyroxylin solvents and various petroleum distillates.**

AND CONTROLLERS

By FRANK J. OLIVER
Associate Editor, The Iron Age

Each machine of the set is self contained and readily removable as a separate unit. Therefore, in case of emergency, and where the particular piece of equipment which the M-G set operates is not required, any of the three machines can be readily removed and used for other purposes. In the pyramid arrangement also, machines of different speeds may be used. Thus a d.c. generator of standard speed may be used with a 25 cycle, 50 cycle, or any other frequency, induction motor by merely using the corresponding required speed ratio in the Texrope V-belt drives. The weight of a pyramid mounted set is also said to be less than one of conventional mounting, due to the saving of material in the base.

Novel Air Circuit Breaker

A NEW oilless circuit breaker, which uses the prestored energy of compressed air for the two-fold function of breaker operation and arc interruption, has been announced by *Allis-Chalmers Mfg. Co.*, Milwaukee. The new breaker consists essentially of a compressed air storage tank, a main air blast valve, three interrupting chambers mounted upon hollow insulator supports, three exhaust mufflers or coolers integrally mounted with the interrupting chambers, and isolating contacts connected in series with the interrupting chambers, also mounted on insulator supports. Each interrupting chamber has a hollow stationary contact forming a port or entrance to the muffler. The movable contact in making contact with the stationary contact closes the port and is normally held in this position by heavy springs.

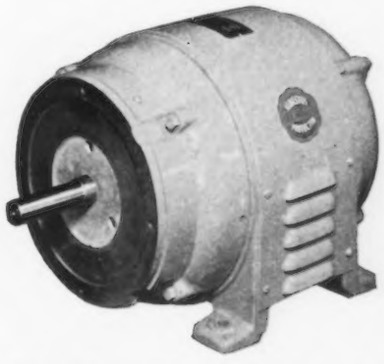
The interrupting process is initiated by admitting compressed air to the interrupting chamber through the air blast valve. The compressed air operating against a piston attached to the movable contact causes the contacts to separate, thereby providing an outlet through which the compressed air escapes into the cooling chamber. As the contacts separate, an arc is drawn, which is immediately enveloped and centralized by the action of the air blast. Simultaneously, a resistor is connected in parallel with a portion of the arc, thereby eliminating high frequency transients and reducing the rate of rise of recovery voltage.

Due to the dynamic, dielectric and cooling effects of the air, coupled with the beneficial action of the resister, a guillotine-like arc interruption characteristic is obtained, so that arcing times of one half cycle or less are consistently produced.

A NEW air circuit breaker approximately half the size of previous devices of the same rating has recently been announced by the *Westinghouse Electric & Mfg. Co.*, E. Pittsburgh. Among the most important improvements in these new breakers is a De-ion arc chamber, a device which is simple in construction and operates on either a.c. or d.c., has long life, and under normal conditions requires no maintenance. Arcing current is limited to one-half cycle, which minimizes the noise and flash accompanying the interruption of a short circuit.

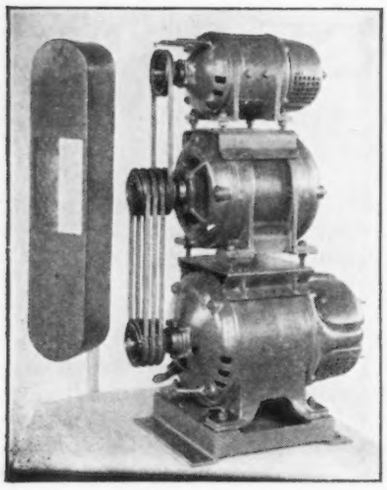
The circuit breaker itself is stronger than previous air breakers. No carbon is used in the contacts, and the protective contact supports have been strengthened. Heavy current through the flexible conductors to contact supports causes a magnetic reaction that increases contact pressure and gives increased protection to the main contacts. Moving parts on the solenoid mechanism have been reduced to a minimum number, the moving core of the mechanism being connected directly to the breaker operating lever. The

IMPROVEMENTS found in the newly improved line of type K totally inclosed, fan cooled motors made by the Howell Electric Motors Co., Howell, Mich., include an all-steel streamlined housing in place of cast iron. Stator frames are malleable iron. The insulation has been improved and the stators are triple treated with a new coil varnish known as Howell-Bond. Fan is made of non-sparking aluminum alloy and is mounted with a split hub for ready removal. Rotor has copper bars welded to copper end rings. These type K motors are made in sizes from 1/2 to 100 hp.

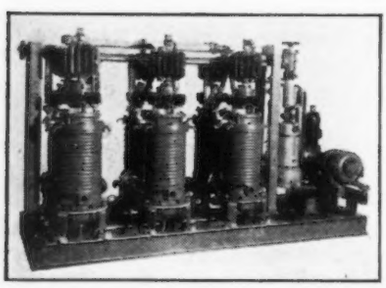


UNIMOUNT end shields with a flat surface to facilitate the mounting of pumps and other directly driven equipment and for the mounting of magnetic brakes are now available on motors made by U. S. Electrical Motors, Inc., 80-34th Street, Brooklyn. These end shields may be assembled on either end of the motor and may be obtained in a number of standardized outside diameters, mounting machine fits, and bolt circles, or unmachined. They may be used also to mount a footless motor to a machine frame if desired.

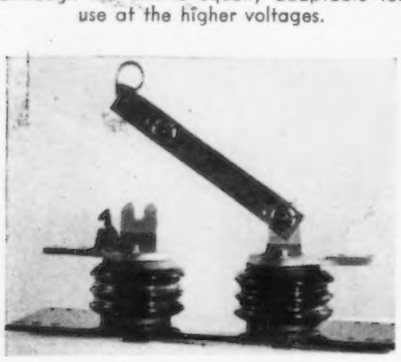
DUMORE type KD heavy duty, double reduction geared motor. Driving motor is rated at about 1/10 hp. at 7000 r.p.m. and output shaft ratings vary from 1/55 hp. at 7 r.p.m. to 1/20 hp. at 71 r.p.m., depending upon the ratio. Gearing is of the worm type, with a hardened steel worm engaging a bakelite gear in the first stage and with a hardened steel gear in the second. Housing is of cast iron. Bronze bearings are used throughout. Mounting is by four tapped holes. Output shaft may be as shown or parallel with the armature shaft. Made by the Dumore Co., Racine, Wis.



FLOOR space and weight are conserved in this Allis-Chalmers pyramid arrangement of motor-generator set with exciter. Differences in speed are readily compensated by the V-belt drives.



EXCITRON is the name given by Allis-Chalmers Mfg. Co., Milwaukee, to a new power rectifier in which single anodes and their individual cathodes are contained in groups of six vacuum tanks mounted on a heavy structural steel frame. The tanks are externally water cooled and are evacuated by vacuum pumping equipment installed at the end of the frame. Arc ignition and control equipment is also mounted on this frame. The efficiency of the Excitron unit is from 3 to 4 per cent higher in the lower voltage brackets, such as between 250 and 300 volts, although the unit is equally adaptable for use at the higher voltages.



NEW Westinghouse type LC indoor disconnecting switch with multiple line pressure blade contacts. On each blade there are 30 silver coated "sled runners", 0.005 in wide, distributed over two rectangular areas ½ x ¾ in. The operating eye and blade latch have been designed to produce a cam or pry-out action. These switches are available in ratings from 200 to 6000 amp. for 5000-volt service, and in sizes from 400 to 6000 amp. for 7500 to 34,500 volt service.

BELOW

TO complement its line of air-cooled power transformers, the Acme Electric & Mfg. Co., Cleveland, is now making units with 15 and 25 kva. ratings. These sizes can be had with primary voltages of 575, 230/115 or 460/230 and secondary voltages of 230/115. The manufacturer claims high full load operating efficiency through such features as full air draft ventilation, well insulated coils, cores of thin gage, low loss steel and balanced proportion of core and coil. Air cooled transformers are especially adapted to industrial applications where oil-immersed transformers may affect the fire risk.

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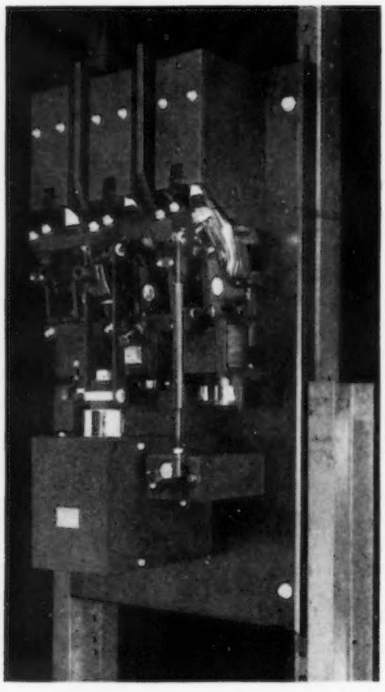

DE-ION arc chambers in the new Westinghouse air circuit breakers have about twice the current carrying capacity of previous breakers of the same physical size. Five sizes are available covering a range of operating currents from 15 to 6000 amp. at 600 volts on a.c. service and 15 to 10,000 amp. d.c. Interrupting capacities range from 40,000 to 80,000 amp.

ALL welded sheet steel construction is used in the new General Electric class DTSR Pyranol capacitors for power factor correction in industrial plants. Feet are provided for floor or bracket mounting and there are eyes for ceiling suspension. While the bodies of the capacitor units are exposed to the air stream, bushings, buses and fuses are inclosed in a dust-tight compartment, and the discharge resistors are built in. Conduit knockouts are provided on top and both sides. Fuse clips and ferrules are silver plated to reduce oxidization.

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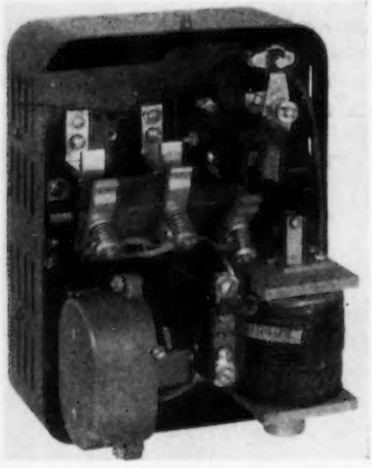
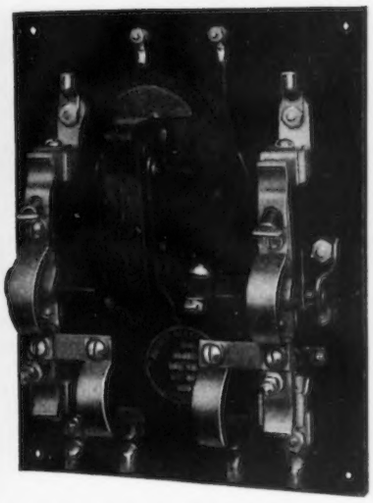


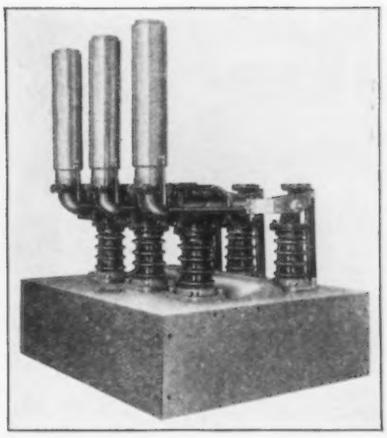
DEFINITE mechanical time starter made by General Electric for general purpose constant speed d.c. motors where jogging is not required. It is rated up to 5 hp., 115 volts, and 10 hp., 230 volts, and consists of a solenoid operated multi-finger contactor with an isothermic overload relay. In addition, there is a unique time-delay escapement mechanism in constant engagement with the operating shaft. This mechanism restrains the shaft in the starting motor, but permits quick opening through the action of a positive over-running clutch. The overload relay is easily set for either manual or automatic resetting after overload.



AUTOMATIC transfer switch, spring gravity drop-out type, for automatically connecting a lighting or power load to an emergency source in case the voltage of the main circuit drops to 70 per cent or less. It restores the load to the normal source when the voltage reaches 90 per cent. This unit, made by the Zenith Electric Co., 845 S. Wabash Avenue, Chicago, is supplied in one, two, three and four pole construction for a.c. to a.c., a.c. to d.c., d.c. to d.c. or d.c. to a.c. Current capacities range from 30 to 300 amp. Standard voltages are 110 to 120 or 208 to 240 volts, 25, 50 or 60 cycle, and 115 or 230 volts d.c. Contacts are copper to copper and they have a rolling and wiping action.

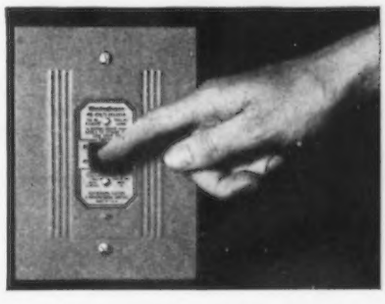
METAL clad micro switches are now available from the Micro Switch Corp., Freeport, Ill., with housings of strong die cast metal. Bottom plate is easily removable for making connections. Terminals will accommodate No. 14 solid wire. Hub takes a 1/2-in. conduit. Switch is available with either open or closed top.

DURAKOOL metal mercury switches are available in capacities up to 200 amp. and may be used for motor starting. Two special reducing agents are said to prevent deterioration of the mercury, increase the efficiency and reliability in operation and assure long life. As many as 2400 interruptions per min. may be made. Made by Durakool, Inc., Elkhart, Ind.

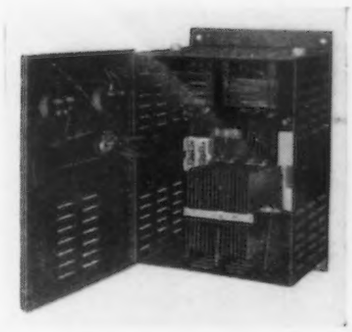


COMPRESSED air is used for the dual function of breaker operation and arc quenching in the new type AB-15-500 Allis-Chalmers circuit breaker, rated at 600 and 1200 amp. at 15 kv., with interrupting capacity of 500,000 kva.

TYPE RQ Photo-Troller is a low-priced photoelectric relay for use in counting, sorting and similar functions. This Westinghouse unit has two normally open and two normally closed contacts, each rated at 10 amp. on 115 volt a.c. circuits. The relay operates on a change of 40 ft.-candles, if not more than 15 ft.-candles of extraneous light is present. Increased sensitivity is obtained by means of a condensing lens. The unit is suitable for wall or bench mounting.



WESTINGHOUSE type MO Multi-Breaker is a small, inexpensive switching device with overload protection. The unit is factory calibrated and sealed so that proper capacity cannot be exceeded. The indicating handle shows whether the breaker is on, off or tripped. The breaker cannot be held closed on a short circuit or overload. The unit is made in 15, 20 and 25 amp. capacities and several styles of one or two poles, two or three wire, solid or grounded neutral and for 115 to 230 volts a.c.



SELENIUM plates are used as the rectifying medium in the new type SR Fansteel dry plate rectifiers, supplied for practically any d.c., industrial requirement, such as for magnetic chucks and clutches, lifting magnets, machine tool controls, battery charging, solenoid valve operation and circuit breaker actuation.

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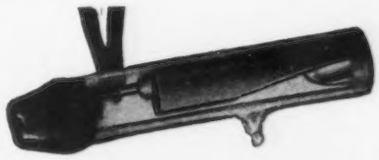

KON-NEC-TOR delayed action, sealed-in mercury switch, recently announced by the Lamp Department, General Electric Co., Hoboken, N. J. The delayed-action characteristic of these switches is obtained by the restricted flow of mercury through a small orifice at the bottom of a metal chamber inside the switch. These units may be obtained with time intervals of 1/2 to 15 sec. for circuit opening and from 1/2 to 10 sec. for circuit closing. They may be operated either by cam or lever action or by means of a solenoid.

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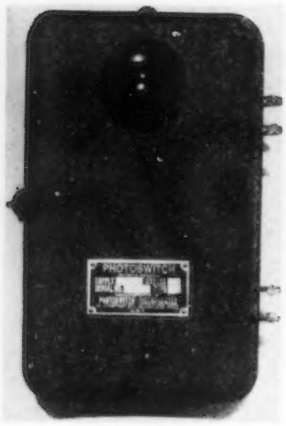
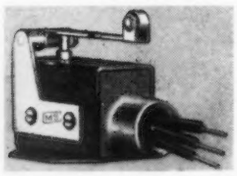
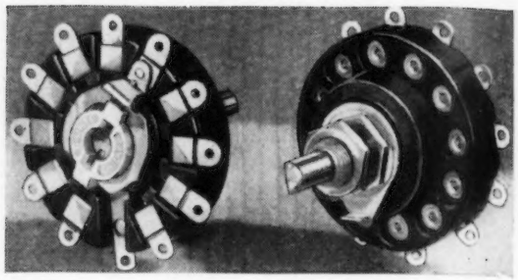
THIS large size resistor of 500 watts capacity has been introduced by the Ohmite Mfg. Co., Chicago. It is 12 in. long and 2 1/2 in. in diameter. A 1000-watt size is also available, measuring 20 x 2 1/2 in. The resistance wire is accurately wound on a porcelain core and is locked with a vitreous enamel coating which is said to conduct away generated heat efficiently. These big resistors are also furnished in Corrib type with corrugated ribbon winding.



PHOTOSWITCH type A14B electric eye limit switch is of rugged construction for application in heavy industries, such as steel mills, in controlling and limiting the motions of heavy objects like billets, cranes and hoists. The light source is in a weatherproof housing. Photoswitch, Inc., 21 Cambridge Street, Cambridge, Mass., has also announced type A20C limit switch which operates directly from the light given off by red hot metal of any shape, no auxiliary light source being required.



ACTUATOR with operating ratio of about 8:1 for attachment to regular and metal - clad micro switches made by the Micro Switch Corp., Freeport, Ill. The mounting holes register with those on the switch case. Pivot point and case hardened roller have oilless bronze bearings. A pressure of 2 oz. at the end of the lever arm will exert a pressure of 16 oz. at the actuator point, and movements are inversely proportional.



MODEL 111 small size, high current tap switch, with rating of 5 amp. at 120 volts and 3 amp. at 240 volts, has been added to the line of power tap switches made by the Ohmite Mfg. Co., 4835 Flournay Street, Chicago. Shaft diameter is 1/4 in. Switch is a single pole rotary selector type with cam and roller mechanism to provide slow-break and quick-make action for a.c. Contacts are silver to silver. Base is ceramic material.

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TYPE M2 Multi-breakeR, made by the Square D Co., Detroit, in capacities of 50, 70, 90 or 100 amp. and for 110/230 volt service, either with a three wire solid neutral or two pole and no neutral. Overload on one pole automatically trips both poles simultaneously. Like other multi-breakers, it is trip free and cannot be held open on overload. The breaker is made for flush or surface mounting.

S & C low voltage cutouts shown suspended from transformer secondary terminal block. Rated at 250 volts, 100 amp., with interrupting capacity of 5000 r.m.s. amp., these cutouts are for use on low voltage distribution systems to prevent needless transformer failures, to isolate faulty sections in an interconnected system of secondaries and to protect against overfusing. A prismatic reflector attached to an indicator arm and concealed during normal operation, is exposed downward after a link blows. These type LV cutouts are made by Schweitzer & Conrad, Inc., Chicago.

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new breakers are adjustable to front-of-board, drawout, back-of-board, and separate inclosure mounting.

Wire Wound Resistors

A COMPACT design of Ohiohm ceramic-insulated resistance unit is now being manufactured by the *Ohio Carbon Co.*, 12508 Berea Road, Cleveland, in addition to its line of carbon resistors. The wire-wound units are applicable to a wide range of electrical uses in the plant, such as original equipment or replacements on photoelectric safety and counting devices, motor-starters and relays, or for shop testing uses, etc. Standard units are from 5 to 20 watts, guaranteed to plus or minus 5 per cent accuracy.

Compactness is obtained by the use of axial terminal wires instead of projecting side-lugs thereby eliminating the need for end bands and permitting greater effective winding space. The special porcelain core has large radiating surface on inside and outside. The terminal wires are of U or hairpin shape and are passed through holes in the core so that the silver alloy joints between them and the ends of the resistance wires are relieved from all strain. After winding, the wire is covered with a tough baked-on ceramic coating.

Small Diameter Switchboard Wire

TO permit fast, neat installations, a new Deltabeston switchboard wire insulated with purified asbestos and plasticized polyvinyl chloride compound of the type used in Flamenol wire has been announced by the *General Electric* appliance and merchandise department, Bridgeport, Conn. The reduction in overall diameter size of the new wire is particularly marked. No. 12 wire, for example, has been reduced from the standard size of 0.225 in. to 0.195 in. This wire is extremely flexible, is light, bulks up less, and is easily workable. Insulation will not break or crack at bends. A paper separator between the copper and the insulating wall permits clean, quick stripping.

The insulation consists of a seamless elastic tube of the synthetic resinous compound under a wall of purified felted asbestos. This in turn is covered by an impregnated-cotton flame-resisting braid. Bending is facilitated and dielectric strength increased by the synthetic resinous insulation. The damaging effects of heat, moisture, oil, and humidity are resisted by the felted asbestos insulation. The dielectric strength of the new wire is not affected by sharp bends. The wire is approved by Underwriters Laboratories for temperatures up to 90 deg. C. It is available with solid or stranded tinned conductors.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

Figures in italics are 11 months' totals

	December 1939	November 1939	December 1938	12 Months 1939	12 Months 1938
Steel Ingots: (gross tons)					
Monthly output[a]	5,164,420	5,462,616	3,130,746	45,768,899	27,742,225
Average weekly output[a]	1,168,421	1,273,337	708,314	877,808	532,072
Per cent of capacity[a]	85.57	93.26	52.79	64.29	39.65
Pig Iron: (gross tons)					
Monthly output[b]	3,768,336	3,720,436	2,210,728	31,533,370	18,782,236
Raw Materials: (net tons)					
Coke output[c] (net tons)	5,031,797	4,912,773	3,438,445	44,425,123	32,495,800
Lake ore consumed[d] (gross tons)	5,538,374	5,477,969	3,040,700	44,361,289	25,703,050
Scrap iron and steel consumed[r]	3,805,000	4,025,000	2,411,977	35,006,000	21,528,000
Castings: (net tons)					
Malleable, orders[e]	.....	51,778	35,633	*443,504*	*253,970*
Steel, orders[e]	.....	.....	38,342	.....	*294,591*
Finished Steel: (net tons)					
Trackwork shipments[a]	7,355	6,640	2,840	69,250	37,336
Fabricated shape orders[f]	84,383	99,316	163,445	1,305,049	1,256,639
Fabricated plate orders[e]	.....	25,995	28,218	*333,741*	*256,843*
U. S. Steel Corp. shipments[g]	1,304,284	1,270,894	694,204	10,652,150	6,655,749
Fabricated Products:					
Automobile production[h]	462,500††	350,000††	.....	.....	3,725,000††
Steel furniture shipments[e]	.....	$2,142,154	$1,982,023	*$20,316,311*	*$18,373,950*
Steel boiler orders[e] (sq. ft.)	553,796	802,033	891,926	11,098,316	4,199,442
Locomotives ordered[i]	127**	41	28**	415	228
Freight cars ordered[i]	4,381**	7,691	2,674**	56,915	16,539
Machine tool index[j]	93.3	91.2	*	70.0	*
Foundry equipment index[k]	164.8	192.2	141.8	196.5†	106.5†
Non-Ferrous Metals: (net tons, U. S. only)					
Lead shipments[l]	44,881	64,365	33,908	555,074	421,625
Lead stocks[l]	58,777	58,061	115,902	.....	.....
Zinc shipments[m]	53,468	64,407	39,354	598,972	395,554
Zinc stocks[m]	65,995	61,522	126,769	.....	.....
Tin deliveries[n] (gross tons)	11,366	7,870	3,400	71,896	50,660
Refined copper deliveries[o]	107,380‡	*	47,804	948,559	607,672
Refined copper stocks[o]	159,485	*	289,755	*	*
Exports: (gross tons)					
Total iron and steel[p]	.....	605,555	490,095	*5,475,992*	*4,658,041*
All rolled and finished steel[p]	.....	208,233	123,006	*1,602,514*	*1,269,697*
Semi-finished steel[p]	.....	74,868	18,141	*250,257*	*231,494*
Scrap[p]	.....	271,293	321,261	*3,347,291*	*2,653,114*
Imports: (gross tons)					
Total iron and steel[p]	.....	15,216	28,767	*300,452*	*235,783*
Pig iron[p]	.....	2,774	1,237	*37,274*	*31,851*
All rolled and finished steel[p]	.....	4,398	12,744	*153,361*	*142,761*

†Three months' average. *Not available. ††Preliminary. **Includes yearly adjustments. ‡Five-months' average.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; [i] *Railway Age*; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [q] British Iron and Steel Federation; [r] Institute of Scrap Iron and Steel.

THIS WEEK ON THE ASSEMBLY LINE

° ° °

By W. F. SHERMAN
Detroit Editor

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. . . 100,000 miles or three years of driving are guaranteed by Willys in surprise announcement . . . Six plants gain slightly, but assembly totals continue to recede from peak . . . Steel buying in February called certainty . . . Ford cold finishing mill sets record of 902.8 tons of steel in 8-hr. shift . . . UAW's demands on GM are stage dressing for NLRB election campaign.

DETROIT — A sensational announcement late last week revealed plans of Willys-Overland officials to put a new car guarantee of 100,000 miles or three years on 1940 Willys passenger cars and commercial cars. A statement of the plan, in circulation in Detroit on Friday, caused surprise and some consternation among competitors and among suppliers, many of whom wondered what implications there might be in the success of such an unusual eye-catching program.

The plan is announced as an extension of the standard guarantee offered on new cars by members of the Automobile Manufacturers Association. This latter is a warranty on parts and workmanship for 4000 miles or 90 days, whichever shall elapse first.

Early information gave few details and company officials declared at Toledo that many points remain unsettled, although officially the plan was voiced Thursday night at a large dealer meeting in Chicago by Joseph W. Frazer, president of Willys since last year when he left an executive post with Chrysler Corp.

Only official definition of the limits of the plan was that Willys proposes to "guarantee everything that we make ourselves." Tires, batteries, starters, generators, ignition parts and other units, guaranteed by their respective manufacturers, will not be included under the terms of Willys' liberalized guarantee.

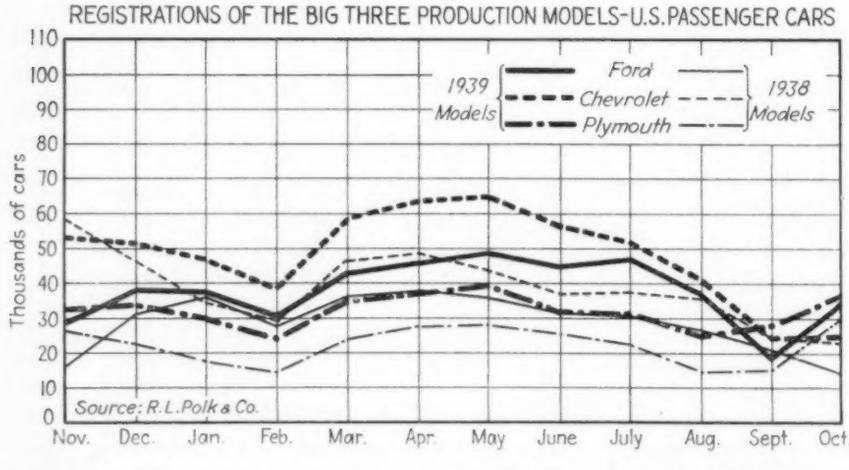
Vendors of other parts—such as forgings, castings, stampings, die castings, plastic molded parts, bearings; plated parts such as bumpers; parts finished in paint, lacquers or other finishes, etc. — are very much concerned by some aspects of the announcement. Frankly they asked whether Willys would "make good" on such parts, made *not* by Willys, but purchased from an outside source; some speculated on possibility of attempts to "write back" parts that might fail and be replaced for individual owners. No answers were forthcoming on these points, although it was indicated that the company might take cognizance of these questions in a detailed explanation which is in preparation for general release.

Regarded as Experiment

Competitors of Willys were taken aback by news of the extended guarantee. Reckoning its cost—for even the 4000-mile clause *is* rated by manufacturers at a definite cost each year —they were unable even to hazard a guess as to the probable outcome of the experiment—and they definitely labeled the Willys venture an experiment.

In the past, long-term guarantees of this nature have been made only in extreme cases where high-priced products, generally in small volume to restricted clientele, were involved. An important truck company has had such a plan on a product of rather restricted volume, and Rolls-Royce offers a three-year guarantee on its exclusive automobile in this country. Moreover, it is recalled that Continental Motors, of Detroit, some years ago had a similar plan under consideration, involving engines only. There was discussion then of a proposal to weld crankcases in place, seal heads on or try to make them integral with the block, then back up the engine with a long-term guarantee, provided that the owner should keep the engine adequately lubricated. The idea was, further, to sell entirely new engines when replacement eventually

REGISTRATIONS OF THE BIG THREE PRODUCTION MODELS-U.S. PASSENGER CARS



THE leveling off of Chevrolet registrations just above the 24,000 mark in September and October, 1939, enabled Ford, reopened after an inventory-vacation period, and Plymouth, early in production of 1940 models, to forge ahead in registrations in October. Actually, of course, these cannot be credited to 1939 registrations, but the overlap for this period is unavoidable. In November, the last month for which data are available, Chevrolet registered 59,520; Ford, 46,005, and Plymouth, 11,772. Chrysler at that time was having the slow-down strike difficulties.

As tools come from the factory they are wrapped in protective oiled paper, boxed and labeled for protection against dirt and moisture, and to facilitate prompt shipment.

Left: Central shipping floor, fireproof tool storage bins and racks on either side.

TO GIVE YOU G. T. D. TOOLS *Quickly . . Safely*

These pictures suggest the facilities maintained by G.T.D. Greenfield to insure adequate stocks, careful packing and prompt shipping, so that tool users all over the world can get any standard G.T.D. Greenfield tools in minimum time. In addition branch warehouses and distributors' stocks are carried in every industrial city in the world.

Lack of a single tap can hold up a vital assembly job, literally cost some manufacturer hundreds of dollars, perhaps as much as he would spend for taps in a year. *That must not happen to Greenfield customers.* Hence these facilities — maintained for *your use.*

Greenfield Tap & Die Corporation · Greenfield, Mass.

Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.

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TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

PARCEL POST IS BIG BUSINESS

From this bench parcel post shipments go daily to nearly every city and state. This service, rendered for distributors, speeds up delivery of the many semi-special sizes and types of tools which constitute a large part of the business. Plenty of light and air make for fast, accurate work.

became necessary, or recondition complete engines for re-sale.

There comes to mind only one other similar mechanical product in general use which bears any unusually long guarantee by its manufacturer. That is the electric refrigerator, which in many cases is sold with a sealed unit that is guaranteed, or "warranted" for three, five and even 10 years. The refrigerator unit has fewer parts than an automobile, and is considerably less subject to abuse than a car in ordinary service. However, it is understood that manufacturers set aside substantial sums to insure against all contingencies during the lifetime of the guarantees on these units. Some refrigerator manufacturers are reported also to have suffered severe financial pains when they first instituted the long-term protection plans.

While Willys is not what might be called a large producer of automobiles at present, its volume is high enough to be a factor of some importance among the independents. And, moreover, this "lowest-priced full-size" car is aimed at the big volume markets. Success of the new program would constitute an impelling reason for other auto builders to follow suit.

The philosophy back of the plan is at variance with the expressed thoughts of some others in the industry who declare that a 100,000-mile car is ready for retirement from the highways. One executive recently expressed the thought that, even with modern materials and alloys, possible fatigue failures of vital parts such as steering linkage and controls, wheel spindles and axles, constitute a sufficient reason to drive these older cars off the road by law for the sake of safety. This at least indicates that there is a difference in opinion regarding the maximum life of motor cars.

Willys is trying now to recover from some post-depression financial troubles and is operating with several millions of RFC money borrowed last year. Some profess to see in this new move an effort to attract attention and build up sales volume. Willys production and sales have appeared statistically to be in a healthy state in the last year. The company is generally understood to have made money in the last quarter of 1939.

Production of 1940 Willys has slowed down since Jan. 1 to about half the December level, but that is true also for most of the other smaller companies, the independents. And the slowing down is incidental to the normal seasonal slackening of pace for all the industry.

Assembly Decline Slow

Plants trimmed output again last week, according to Ward's Automotive Reports, but the decline in total assemblies was less than anticipated at this time of year. Output sagged only to 106,400, and the previous week's total stood at 108,545 passenger cars and trucks. The industry still holds a substantial margin over the level of last year, when the corresponding week's output was only 89,200.

The slow retreat from peak production was mixed with advances—probably temporary—by six plants, while five eased off slightly. Ford-Mercury schedules called for 25,500, compared with 24,900 the week previous; Lincoln-Zephyr was steady at 750. Chevrolet eased off from 27,000 to 25,000, and GM slid from 44,832 to 42,155. Plymouth gained from 12,560 to 13,060, but Chrysler totals were virtually unchanged at 27,535, against 27,605 in the previous week.

The downward drift in final assemblies has been indicated for several weeks, as steel scrap output (auto body scrap and machine scrap) fell off. It is anticipated that February output will be at a lower level, but with an upturn likely late in the month.

Steel Purchases Expected

A major steel executive has estimated that practically all automotive buyers will be in the market for steel and will make commitments for a large part of spring output soon. Some commitments must be made early in February, he indicated, because inventories in some spots will be at the bottom within a few more weeks. In other cases commitments can be held off until late in the month, with delivery needed in March. Some hesitation has been indicated, while buyers study the market carefully, but demand from the plants will not brook much delay.

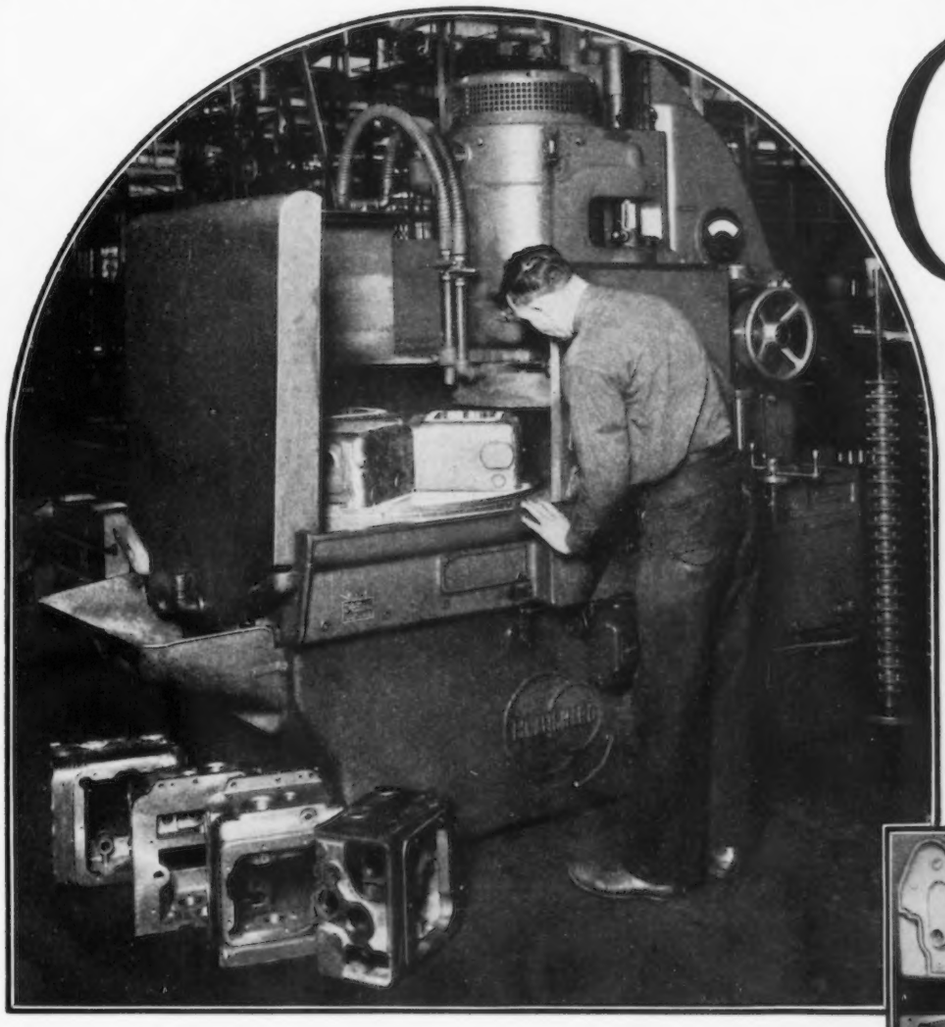
This information follows reports that substantial new tonnages must be placed on the books before long if local mill activity is to continue at peak. At the same time, the Ford steel mill is pressing to maintain maximum output. Ford has inquired for outside steel, but so far has not bought any important tonnage. An inquiry based on requirements for 100,000 cars

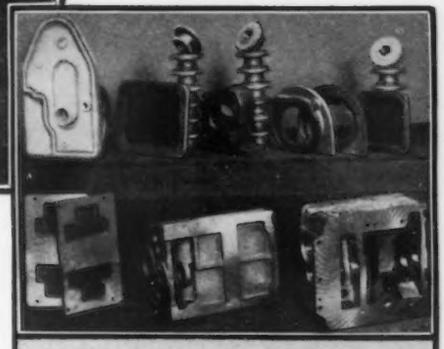
(CONTINUED ON PAGE 74)

THE BULL OF THE WOODS — BY J. R. WILLIAMS

SCRAPING IS *Out*

when surfaces are ground on the Blanchard No. 18





Variety of parts ground on the Blanchard No. 18 at left

HERE is a good example of the way Blanchard No. 18 Surface Grinders are eliminating hand scraping on parts which require flat surfaces for oil-tight joints. 1/64″ of stock is ground off two surfaces of the cast iron gear boxes, shown above, at a production of 15 pieces (30 surfaces) per hour. These boxes are 12″ x 12″ x 18″. A Blanchard No. 18 Grinder with 36″ chuck and a column extended to take 18″ work is used, together with a Blanchard Sectored Wheel, manufactured by the Blanchard Machine Co. The result — Greater production, less spoilage, finer finish, and *elimination of hand scraping*.

Note the variety of parts, above, which are also ground on this machine — further proof of the versatility of the Blanchard No. 18.

Send us samples of your work — they will be ground free of charge — and may show you how to eliminate scraping and other costly second operations.

BLANCHARD

Send for your free copy of the Blanchard Work Book

BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

THIS WEEK IN WASHINGTON

. . . Green denounces NLRB for "outrageous" delays . . . Company claims it was "slugged" into settlement . . . Basing point critics ignore facts, U. S. Steel says . . . Justice Department presents steel distribution data to TNEC.

o o o

By L. W. MOFFETT
The Iron Age

o o o

WASHINGTON — The special House committee investigating the National Labor Relations Board last week heard AFL President William Green denounce the board in bitter terms for unfairness and maladministration, for "outrageous delays" in labor cases, and for promoting CIO unions at the expense of the AFL. At the same time, the committee was told by George B. Christiansen, an attorney for the Mount Vernon (Ill.) Car Mfg. Co., and one of the few representatives of industry who has been called to testify, that his company was "slugged" into a settlement of its NLRB case and required to pay employees $20,000 in back wages.

Mr. Green still regards the Wagner Act as "the Magna Charta of labor," he testified to the committee, but thinks that the board's record of maladministration can be remedied only by a thorough house-cleaning of the NLRB itself. Characterizing it as "anything but a judicial body," the AFL president heatedly denounced NLRB Chairman J. Warren Madden as unqualified for his present post or for any other judicial position. Mr. Green did not even except Board Member William M. Leiserson, most recent member of the NLRB who is regarded as having been appointed by President Roosevelt to put the board's house in order, in his criticism of the labor board.

"They are all out the window as far as I'm concerned," Mr. Green said.

What Federation Wants

The AFL spokesman, while declaring his "unqualified opposition" to Wagner Act amendments proposed by Senator Edward R. Burke, Democrat of Nebraska, and the National Association of Manufacturers, spent considerable time advising the committee on what the AFL wanted in the way of amendments to the act. As outlined on many previous occasions, the federation desires a provision preventing the board from denying to workers "the right of self-determination," and a clause allowing collective-bargaining disputes among rival unions to be taken to the Federal Circuit Court of Appeals. At present, such appeals are confined to unfair labor practice charges against employers.

Citing numerous cases in which he said the AFL felt it had been treated unfairly, one of which involved board conduct bordering on "trickery," Mr. Green blamed the NLRB for the collapse of certain AFL unions, explaining that they could not stand up under constant delays and uncertainties surrounding their status at industrial plants. He denied that his organization is out to knife the industrial union principle.

Skilled Workers Suffer

"We favor both forms of organization but we want to protect the rights of the workers to organize as they choose," the AFL witness said, explaining that he thought the AFL could submit figures to the committee showing that, in cases where unskilled workers were forced to join plant-wide unions in which there was a nucleus of skilled employees, the latter suffered a loss in pay.

With the accusation that 85,000 AFL miners had petitioned the board for the right to bargain collectively and not a single petition had been granted, the AFL head concluded his presentation with the recommendations that the NLRB be "completely revamped so that there will be five members" instead of three, as well as a complete change in personnel so as to insure "a fair and impartial administration."

On the NLRB case involving the Mount Vernon Car Mfg. Co., which is still pending before the United States Circuit Court of Appeals, the committee learned from Mr. Christiansen that an NLRB stipulation which, the testimony showed, satisfied neither the company, the AFL nor the CIO unions, required his company to pay $20,000 in back wages indirectly to employees who had been discharged because they refused to join an AFL union, which had a closed-shop contract with the employer.

$20,000 To NLRB Director

"The settlement that was eventually worked out with the board," Mr. Christiansen said, "and which, of course, is still pending, provides that an election shall be held to determine whether we shall deal with the AFL or the CIO. Instead of paying the men their back wages, paying back to the Government the amount that has been paid out in relief and the usual other things in the board order, the company is to pay a flat sum of $20,000 to the regional director. She is to whack it up on an equitable basis among the men who are to be reinstated."

Earlier in the hearing Committee Counsel Edmund Toland brought out from Abraham Harris, supervising attorney in the board's review division, that after the NLRB handed down its decision favoring the CIO union in the Mount Vernon Car case, it went back on its ruling and effected the "settlement" with the company. The CIO's Steel Workers Organizing Committee has filed an intervening petition with the court, objecting to the board's decision. Mr. Toland brought out this evidence as indicative that the NLRB stands by "strong" cases and abandons "weak" ones.

SWOC Leader Disgusted

Further evidence brought to the committee's attention by Mr. Toland was that John Doherty, a district director of the SWOC, wrote Chairman Madden protesting in caustic phrases the consent decree issued in the Mount Vernon Car case.

On this occasion Mr. Doherty wrote:

". . . The conduct of your body has become such as to make all honest-thinking people thoroughly disgusted with your procedure. In all my dealings with the board I have never in a single instance asked them to do any-

thing in our behalf other than see that we get proper justice under the law.

"If the destiny of the workers is to be placed in the hands of three apparent politically-minded manipulators, I for one am fast becoming of the opinion that the workers would be better served should we vigorously join with the many, many critics of the board in asking that you be stripped of such power as to allow you to use the workers as political pawns.

"You need not lose any sleep in wondering why Congress would delegate a committee to investigate your conduct, and I am only sorry that the (House) investigation is proceeding in a manner as to becloud the issue, namely, for the protection of the industrialists, who by virtue of their position are adequately capable of protecting themselves.

"The channel that the investigation should follow would be, at least to my way of thinking, directed in finding out why the board would issue an order based upon the evidence in the case and then would completely reverse itself and give the workers the same consideration as so many slaves."

Government Orders

WASHINGTON — Government contracts for iron and steel products as reported by the Labor Department's Public Contracts Division for the week ended Jan. 20, totaled $934,502. For the same period contracts for non-ferrous metals and alloys aggregated $567,373, and for machinery $533,165. Details follow:

Iron and Steel Products

Massachusetts Gas & Electric Light Supply Co., Boston, Navy S & A, conduit pipe	$40,355
Camden Forge Co., Camden, N. J., Navy S & A, roller tracks	384,900
Central Iron & Steel Co., Harrisburg, Pa., Navy S & A, steel plates	Indefinite
Wayne Tool Co., Waynesboro, Pa., Navy S & A, reamers and countersinks	12,754
Noland Co., Inc., Washington, Panama, Canal, pipe fittings	17,817
Duffin Iron Co., Chicago, Panama Canal, structural steel	22,100
Bethlehem Steel Co., San Francisco, Interior Reclamation, reinforcement bars	11,486
Columbia Steel Co., San Francisco, Interior Reclamation, reinforcement bars	29,125
C. J. Rainear & Co., Inc., Philadelphia, Panama Canal, wrought iron pipe	11,100
American Bridge Co., Gary, Ind., TVA, lock gates	248,430
Crescent Tool Co., Jamestown, N. Y., War Air Corps, pliers	12,072
Peco Mfg. Corp., Philadelphia, Ordnance War, machining forgings	75,000
Carnegie-Illinois Steel Corp., Chicago, Ordnance War, carbon steel	12,054
The Maryland Culvert & Pipe Co., Baltimore, Procurement, pipe	Indefinite
Majestic Mfg. Co., St. Louis, War QMC, gas ranges	20,455
The Atwater Mfg. Co., Plantsville, Conn., Ordnance War, steel forgings	26,371
Noland Co., Inc., Washington, Naval Power Factory, pipe and pipe fittings	10,479

Non-Ferrous Metals and Alloys

Federated Metals Division, American Smelting & Refining Co., San Francisco, Navy S & A, bronze manganese	$22,400
Kennecott Sales Corp., New York, Navy S & A, copper ingot	107,491
Hudson Smelting & Refining Co., Newark, N. J., Navy S & A, pig lead	27,639
North American Smelting Co., Inc., Philadelphia, Navy S & A, pig lead	38,610
Aluminum Co. of America, New Kensington, Pa., Navy S & A, aluminum	33,323
Division Lead Co., Chicago, Navy S & A, pig lead	40,185
The International Nickel Co., Inc., New York, Navy S & A, nickel-chromium-alloy	11,340
Chase Brass & Copper Co., Inc., Waterbury, Conn., Ordnance War, cartridge brass cups	76,360
The International Nickel Co., Inc., Huntington, W. Va., Puget Sound Navy Yard, nickel-copper-aluminum-alloy	21,406
Revere Copper and Brass, Inc., Baltimore, Panama Canal, brass, copper	15,160
The Harvey Metal Corp., Chicago, Ordnance War, brass forgings	23,865
Mueller Brass Co., Port Huron, Mich., Ordnance War, brass forgings	107,550
Ostby & Barton Co., Providence, War QMC, collar insignia	31,983
Henry Moss & Co., Inc., Brooklyn, War QMC, cap insignia	10,057

Other Machinery

Sherwood Brass Works, Detroit, Norfolk Navy Yard, diesel engine parts	$18,400
The Buda Co., Harvey, Ill., Norfolk Navy Yard, diesel engine parts	18,623
W. E. Shipley Machinery Co., Philadelphia, Navy S & A, planer	17,121
William Sellers & Co., Inc., Philadelphia, Navy S & A, planer	29,512
The Cooper Bessemer Corp., Mt. Vernon, Ohio, Navy S & A, diesel engine	36,731
Lucian Q. Moffitt, Inc., Akron, Ohio, Norfolk Navy Yard, bearings	21,040
American Bosch Corp., Springfield, Mass., Norfolk Navy Yard, diesel engine parts	32,150
Northwest Engineering Co., Chicago, Panama Canal, crawler units shovel	57,465
The Thew Shovel Co., Lorain, Ohio, Panama Canal, crawler units shovel	59,400
T. W. & C. B. Sheridan Co., New York City, GPO, covering machine	29,038
Baldwin-Southwark Corp., Eddystone, Pa., Interior Reclamation, governors	44,450
The C. S. Johnson Co., Milwaukee, Interior Reclamation, concrete batching and mixing equipment	11,447
The Snow & Petrelli Mfg. Co., New Haven, Conn., Norfolk Navy Yard, diesel engine parts	43,998
Ingersoll-Rand Co., Painted Post, N. Y., Panama Canal, air compressors	14,750
Barber Greene Co., Aurora, Ill., TVA, conveyor parts	15,928
Heyl & Patterson, Inc., Pittsburgh, Maritime Commission, gantry cranes	83,110

Richberg Warns Auto Dealers of U. S. Regulation

WASHINGTON — Donald R. Richberg, former NRA administrator, warned members of the National Automobile Dealers Association at their convention last week against inviting governmental regulation of their business after the convention concluded the consideration of a proposed new legislative program under which automobile manufacturers would be licensed by the Federal Trade Commission.

NAM Warns Against War Psychology in U. S.

WASHINGTON — Declaring it reflects the attitude of industry, the National Association of Manufacturers has transmitted a statement to members of Congress urging that it proceed with caution and prudence in expenditures for military purposes. The statement, sent by W. W. Prentis, Jr., president of the association and of the Armstrong Cork Co., said that the association believes in and advocates adequate preparation for national defense but abhors war and views with apprehension every incident and act that tends to excite a war psychology.

Survey Seeks Data On Canning Industry

CHICAGO — The National Canners' Association, which met here last week at its 33rd annual convention, heard Dr. Neil Carothers, Lehigh University, tell of a survey being made of the canning industry.

The survey seeks to determine whether the industry is under-financed and under-capitalized, whether it has an abnormal number of failures and liquidations, how can and machinery purchases are generally financed, the function of the warehouse receipt in financing the canning industry, source of capital, function of the broker, effect of various Federal agencies on the industry, effect of the chain store, the super-market, the I.G.A., and many others.

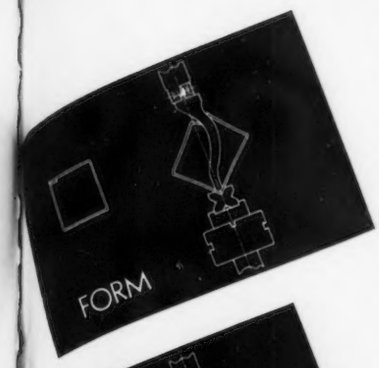
The canners were told by James W. Young, director of the Bureau of Domestic and Foreign Commerce, that the bureau is establishing a new service which will provide industry with information on sales, inventories, new orders and unfilled orders of companies in all lines of business.

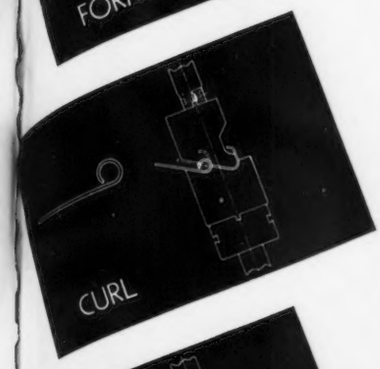
External corrosion of cans was discussed by C. L. Smith, Continental Can Co., Chicago, and K. C. Dykstra, American Can Co., Maywood, Ill.

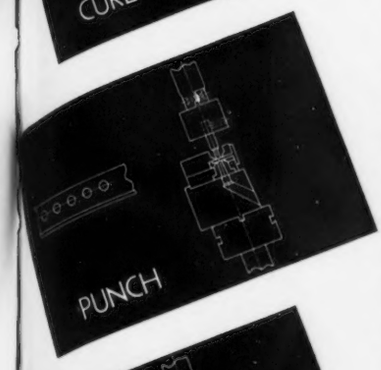
Mr. Smith pointed out that the present highly competitive condition in the canned foods industry makes it necessary for cans to be bright and attractive. At the same time, he said, the long periods between production and distribution have made this end increasingly difficult to attain.

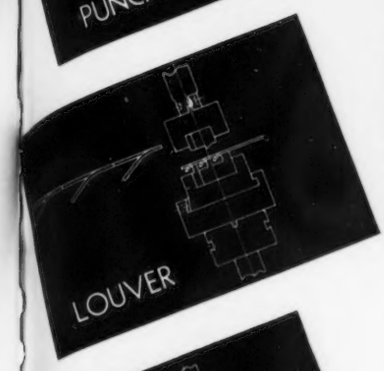
Mr. Dykstra classified external corrosion in the order of its occurrence as follows: Corrosion attributable to general plant practices; corrosion due to unusual water conditions; and corrosion in the warehouse.

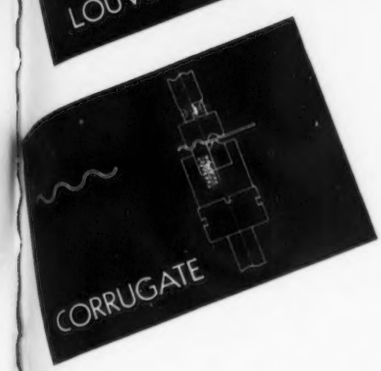
STEELWELD *Bending Presses*

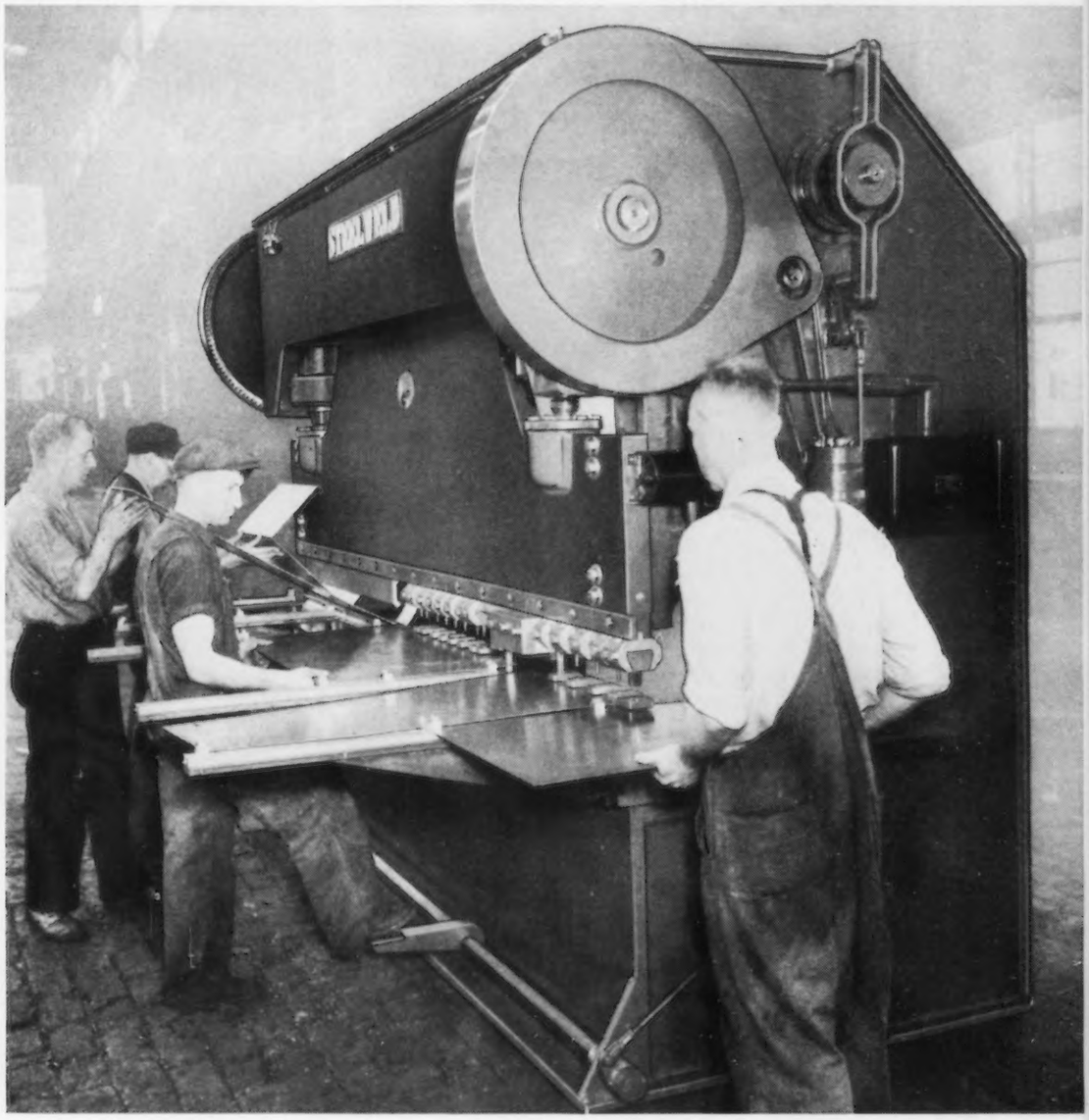












Steelweld Bending Presses are indeed versatile tools. Wherever plate is used in all thicknesses up to ¾" and lengths to 20'-0" and over, these machines will save money and produce better appearing products.

Bending, forming, blanking, drawing, rubber-forming, and multiple-punching are easily performed. Several operations may be handled by passing the work successively through various dies set in position along the length of the machine. Fade-out and taper-work is easily accomplished by use of the ram-tapering mechanism.

Steelwelds are modern presses designed to meet today's demands. Sales representation in principal cities.

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Other products: CLEVELAND CRANES and CLEVELAND TRAMRAIL

INDUSTRIAL NEWS FROM CANADA

Canada Places Large Orders For Ships and Aircraft

OTTAWA — Immediate and extensive expansion in Canadian industrial activities, with special benefits to the iron and steel industry, is indicated in the announcement by C. D. Howe, Minister of Transport, regarding a broad purchassing program of naval equipment and aircraft, involving approximately $32,500,000. These new orders will tax capacity of Canadian shipyards and aircraft plants for many months to come.

On behalf of the Canadian War Supply Board, Transport Minister Howe stated that orders have been placed or are being placed for 46 anti-submarine boats of the "whale-catcher" type, for use in the Canadian and British navies; 28 mine-sweepers, for which tenders will be opened Feb. 8, and a large fleet of small aircraft salvage motor boats, lighters and loaders. The cost of the construction and equipment of the "whale-catcher" contracts is reported at $25,000,000. These ships are larger than the mine sweepers and will carry anti-aircraft guns. In addition, orders for motor boats and barges will run about $300,000. Delivery of the vessels will start next October, and some of the order will be with British shipbuilders.

More Orders for Airplanes

For the British Empire air training plan, orders have been placed for 4360 airplanes, and in addition the Canadian government has ordered aircraft costing $10,000,000 for the Royal Canadian Air Force, Mr. Howe stated, and of this amount about $7,500,000 will be spent in Canada. In Canada contracts have been let and construction is proceeding on 404 Fleet trainer planes; 404 De Haviland Tiger Moths and 100 Noorduyn North American planes. For the above aircraft the War Supply Board has placed orders for 508 Kinner engines in the United States and in addition has ordered 517 Harvard planes in the United States. Mr. Howe stated these were orders for the Empire air training plan and in addition Britain has ordered fighters, bombers and reconnaissance machines in Canada. Airplane engines will be ordered in Great Britain to the extent available there and the remainder will be purchased in the United States, Mr. Howe stated.

Other undertakings now in hand, Mr. Howe stated, include the manufacture of machine gun carriers, motorized vehicles between a tank and truck, with caterpillar wheels, carrying machine guns, ammunition and crews for speedy action in the field. The Minister did not state what plant would produce this equipment, but he did state they would be quite expensive.

For the air training plan additional orders, including the following machines and parts, have been placed in Britain: 854 Fairey Battle planes complete; 1622 Anson Fuselages without wings, for which wings will be built and added in Canada; 227 Rolls Royce Merlin engines; 227 air screws (propellers); 823 Cheetah engines and 509 De Haviland Gypsy Moth engines.

Several Plants Tooled

In connection with munitions production, Mr. Howe stated that several large Canadian plants are completely tooled for large-scale production when the need arises, and several educational orders have been placed by Great Britain which run into millions of dollars. At Sorel, Quebec, Sorel Steel Industries, now spending $2,000,000 on plant addition, and new equipment, has received a large contract for 24-pounder guns received from Britain and it is likely that contracts for other types of guns will be placed with this firm as the war progresses. John Inglis Co., Toronto, which received a contract for production Bren Guns for the British and Canadian governments, and has spent some $3,000,000 on equipment installation for this production, will start deliveries in April, some three months ahead of schedule. Other large orders for Bren Guns are expected to be awarded soon with this company.

Transport Minister Howe emphasized that all orders placed to date for airplanes, boats, machine guns and other war needs, are designed to keep plants affected running at peak capacity for some time to come, but these only are initial orders. Others will be placed as soon as completion of present contracts is in sight. Plants engaged will be kept going full speed ahead pouring out equipment for war for Canada and Britain.

Under the dovetailing manufacturing arrangement with Britain immense quantities of certain types of equipment will be made in Canada, while other types will not be turned out in this country at all. For example, while Canadian plants will be pushed to the limit turning out flying craft, Mr. Howe stated, no airplane engines will be made in Canada. Mr. Howe stated: "If you hear someone say we are not making such and such in Canada, bear in mind that we have an interlocking program minutely worked out with Britain. If we are not making one type of machine or equipment here, we are making great quantities of something else which will keep Canadian factories busy."

Canada's 1939 Steel Output Was 1,384,827 Tons

OTTAWA — Iron and steel production in Canada in December reached a high for the year. Production of pig iron jumped 8 per cent over November's total to 94,620 gross tons and consisted of 83,816 ton of basic, 6039 tons of foundry and 4765 tons of malleable iron. Output of ferroalloys in December totaled 10,494 tons against 7285 tons in November, and included spiegeleisen, ferrosilicon, ferromanganese, silicomanganese, ferrochrome, calcium silicon and ferrophosphorus. Steel ingot and castings production in December amounted to 150,062 tons against 147,182 tons in November and included 143,230 tons of steel ingots and 6823 tons of castings.

Total production of pig iron in 1939 was 756,182 gross tons against 705,427 tons in 1938. Steel ingot and direct steel castings reached a total of 1,384,827 tons compared with 1,155,190 tons in 1938, and output of ferroalloys totaled 75,234 tons in the year as against 55,926 tons in 1938.

The following table shows monthly

production record of iron and steel in Canada for the year 1939.

	Pig Iron	Steel Ingots and Castings	Ferro-alloys
January	57,660	78,198	2,855
February	41,333	77,179	5,299
March	40,723	95,697	3,526
April	46,254	99,752	4,284
May	57,746	116,983	4,925
June	52,805	107,902	10,015
July	59,587	111,149	6,475
August	69,520	122,019	3,313
September	65,954	124,384	10,406
October	85,758	149,890	6,357
November	87,822	147,182	7,285
December	94,620	150,062	10,494
Total	756,182	1,334,827	75,234

Canadian War Contracts Total $2,000,000 in Week

OTTAWA—Orders placed by the Canadian War Supply Board during the past week, included 433 contracts of value of approximately $2,000,000, according to announcement by Transport Minister Howe. The orders included war munitions, airplanes and parts, fuel, machine tools, of which orders outside Canada had a value of $192,000. The list included the following orders: Munitions valued at $30,000 to Sawyer-Massey, Ltd., Hamilton, Ont. Aircraft supplies: Mackenzie Air Service, Ltd., Edmonton, $95,472; British Air Ministry, $68,250; Trans-Canada Airlines, Montreal, $14,475; Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Que., $11,491; Noorduyn Aviation, Ltd., Montreal, $6,829. Mechanical transport: Ford Motor Co. of Canada, Ltd., Windsor, Ont., $29,925; Martin-Parry Corp., West Port, Pa., $117,757. Machinery, tools and hardware: F. F. Barber Machinery Co., Ltd., Toronto, $5,422.

Pig Iron and Steel Exports From Canada Under License

OTTAWA — An order-in-council passed by the special session of the Canadian Cabinet, called to deal with the wheat export question, banned export, except by license, of a list of subsidiary Canadian mining products that supplements earlier arrangements to prevent products of Ontario mines from reaching enemy countries. Already shipments of Canada's chief mine products — gold, nickel, copper, zinc and lead — had been controlled through arrangement with the British government.

To the above list, the order-in-council of the past week, included, artificial abrasives, including abrasive wheels and grindstones; pig iron; steel ingots; blooms and billets; iron and steel rails; pipe and tubes, new or used; mica, including scrap and waste;

platinum concentrates and residues; radium and uranium salts and minerals (including pitchblende); selenium, tellurium, pyrites, molybdenum ore and concentrates; tungsten, carbide, spiegeleisen, silico-spiegel and silico-manganese.

. . . GREAT BRITAIN . . .

. . . Increasing export demand cannot be satisfied

LONDON, Jan. 30 (*By Cable*)—There has been an increasing overseas demand for British steel as neutrals are feverishly strengthening defenses and increasing armaments, but British home demand is absorbing the bulk of the output, and export licenses are issued sparingly.

The government is taking over all shipbuilding and is considering the formation of a new Admiralty Department. The question of the reopening of idle yards is under consideration. Combined naval and merchant tonnage under construction is reported at very high levels.

The shortage in semi-finished steel is hampering sheet mills expanding on export orders even though for distant shipment. Though the government air rail shelter program is virtually complete, mills are still operating at capacity output on commercial contracts.

There is good demand for tin plate with export sales now up to 33s. basis IC f.o.b.

With the renewed activity Continental steel buyers are striving to place orders to build up stocks, but work is hampered by the limitation of raw materials, especially coke and ore and a restriction on output is possible. Belgian mills are also hampered by the recent calling up of men.

Belgian and Luxemburg mills report a slight lessening in export buying pressure.

British and French Buying Groups Join

SATURDAY, Jan. 27, saw the mass removal of the British Purchasing Commission from the temporary quarters of the expanded British Consulate offices at 25 Broadway, New York, to new quarters at 15 Broad Street. The British group will occupy the 11th floor. The French Purchasing Commission moved into the same building last December and now occupies a large part of the 19th

floor. The latest move is in line with closer coordination of purchasing activities of both groups.

Coordination will be effected through the Anglo-French Purchasing Board. The board is headed by Arthur B. Purvis, head of the British Purchasing Commission, with J. Frédéric Bloch-Lainé, head of the French Purchasing Commission as vice-chairman. Secretary-general is G. Miller Hyde. Mr. Hyde is located in Washington and he is acting largely as a liaison officer with the United States Government in matters that may arise out of the purchase of war materials which may conflict with our own preparedness program. Besides coordinating purchases, the board will also supervise all major policies of both commissions. The general routine of purchasing will continue to be handled through the officials of the two missions, but where the requirements are identical contracts will be placed jointly so as to prevent competitive bidding by the two nations for the same supplies.

Buying of steel, pig iron and scrap will still be handled through the agencies that were doing this purchasing before the war, such as the British Iron and Steel Federation in London.

Both the British and the French have indicated that purchases of aircraft would continue in this country for the duration of the war. After very heavy purchases of machine tools last fall, buying of this type by the French has been greatly reduced because of the inability of most manufacturers to make deliveries before 1941.

Fourth Quarter Freight Loadings Increase 16.3%

FREIGHT cars loaded in the fourth quarter of 1939 showed an increase of 16.3 per cent above volume in the corresponding period of 1938, according to the Alexander Hamilton Institute. This increase was smaller than the 18.4 per cent gain anticipated by the shippers' boards. Nevertheless, car loadings in the final quarter of 1939 gained 6.5 per cent over the third quarter. This was a larger gain than in any year of the previous decade.

Bolens Mfg. Co. Acquires Gilson-Bolens Property

PORT WASHINGTON, Wis.—The Bolens Mfg. Co. has purchased the property of the Gilson-Bolens Mfg. Co. and will conduct the business and operate the foundry and machine shop which has been one of the city's principal industries for 50 years. The new firm will make garden tractors, power hoes, power lawn mowers, tilting and revolving office chair irons and other office furniture accessories. Harry W. Bolens is president and treasurer, B. F. Klein, vice-president; Mrs. H. W. Bolens, secretary, and Arthur R. Boemer, assistant treasurer and sales manager.

SWOC Loses Election At McKees Rocks Plant

PITTSBURGH — An independent union at the McKees Rocks plant of the Pressed Steel Car Co. nosed out the SWOC at an NLRB election last week, with 680 employees favoring the unaffiliated Car & Foundry Workers' Union, Inc. and 442 voting for the SWOC.

Harvester Offers 3 New Tractor Models

CHICAGO—Three new models of diesel-powered, crawler-type tractors, rounding out a complete new line of this type tractor for industrial and agricultural use, were announced here last week by the International Harvester Co. The new International diesel tractors are being displayed for the first time at the National Road Show now being held at the International Amphitheatre in Chicago.

With a total of four diesel crawler-type tractors now in production, the Harvester company has placed eight new tractor models on the market within the last year, four new tractors of the Farmall wheel-type having been introduced in the last six months of 1939. In addition to the three new diesel tractors announced today, the company has been marketing for some months the largest diesel tractor in the new line.

The new diesel tractors are being built at the company's Tractor Works in Chicago. The diesel motors, gears and several other parts, will be made at the Milwaukee Works, in Milwaukee.

Smallest 6800 lb.

The new crawlers range in size from the smallest unit, weighing 6800 lb. and providing 30 hp. at the drawbar, to the largest, weighing 22,000 lb. and providing more than 70 hp. at the drawbar.

Gears for these new tractors are made in the Milwaukee Works, and consist of hard alloy steels. Transmission and final drive gears are made of chrome-molybdenum steel. In tests, the gears for crawler tractors have withstood loads as high as 250,000 to 300,000 lb. a sq. in.

All the new models are powered with 4-cylinder, 4-cycle diesel motors except the largest tractor, which has a 6-cylinder, 4-cycle diesel motor. The bore of the cylinders ranges from 3⅞ in. in the smallest model, to 4¾ in. in the largest unit. The stroke ranges from 5¼ in. in the smallest tractor, to 6½ in. in the largest. The piston displacement is 247.7 cu. in. for the smallest model and 691.1 cu. in. for the largest.

Other features of the new diesel crawlers are replaceable cylinder sleeves, crankshafts hardened by the electrical induction method, aluminum alloy pistons, full pressure lubrication system providing lubrication for all operating parts, multiple disk steering clutches, balanced weight of the tractor on tracks, variable speed governor and an operator's seat designed to give the operator comfort and easy visibility of all important parts of the tractor.

California Industries 16th Conference Feb. 8-10

SAN FRANCISCO — California's iron, steel, and allied industries will hold their 16th annual conference at Del Monte, Cal., Feb. 8-10. The Pacific Coast Steel Fabricators Association will held its annual meeting then. B. J. Osborne, Moore Dry Dock Co., Oakland, Cal., is chairman of the former group.

Westinghouse Atom Smasher Shown at East Pittsburgh

PITTSBURGH—First public demonstration of the Westinghouse Electric & Mfg. Co. atom smasher was made Jan. 29 before a group of 50 science writers, technical editors, and educators at the Westinghouse Research Laboratories, East Pittsburgh.

. . . PERSONALS . . .

BENTON J. WILLNER and MAURICE E. O'BRIEN have been appointed assistant vice-presidents of the Inland Steel Co., Chicago. Mr. Willner will assume the post of manager of sales of the sheet and strip division, of which he has been assistant manager of sales since 1936. He joined the company in 1927 at its Indiana Harbor works and three years later was transferred to the department of inspection and metallurgy at the Chicago office. He became a member of the staff of the sheet and strip steel sales division in 1931.

Mr. O'Brien is manager of sales, carbon steel bars and billets, a position he has held since 1936. He became affiliated with the sales department in 1934, prior to which he was associated with the Illinois Steel Co.

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L. A. ESTES has been appointed executive vice-president and general manager of the South Chester Tube Co. and of its subsidiary, the South Chester Terminal & Warehousing Co., Chester, Pa. Before going with the South Chester Tube Co. he was manager, commercial division, Carnegie-Illinois Steel Corp., Pittsburgh, and in that capacity supervised market re-

BENTON J. WILLNER (top) and MAURICE E. O'BRIEN (bottom), new assistant vice-presidents of Inland Steel Co.

search, sales statistics and promotion, advertising, sales training, and trade relations. Prior to his connection with Carnegie-Illinois, Mr. Estes was affiliated for many years with Truscon Steel Co., Youngstown, having been at first in the export department and later district manager of sales at Indianapolis and Boston.

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WALTER E. MACKLEY has been appointed manager of the Buffalo office of American Steel & Wire Co., subsidiary of U. S. Steel Corp. Mr. Mackley's entire business career has been with American Steel & Wire Co. He started in the New York office in 1912,

L. A. ESTES, new executive vice-president and general manager of the South Chester Tube Co.

and has worked through various positions. At the time of his present appointment he was manager of manufacturers' sales department in the New York office. Mr. Mackley succeeds F. O. HOWARD, who has been transferred to New York.

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RUSSELL H. DRAGSDORF has been named plant manager of Chrysler Corp.'s Dodge truck plant. Mr. Dragsdorf has been plant engineer and labor relations supervisor for the truck organization in recent years and has been associated with the company for 22 years, for 15 years with the passenger car plant engineering division. During the Century of Progress Exposition in Chicago he served in a supervisory capacity in the Chrysler exhibition building and after that became affiliated with the truck manufacturing organization. He succeeds R. M. Hiedy, who died recently.

A. S. ANDERSON, who has been in charge of special equipment engineering department of the Dodge truck plant, has assumed the additional duties of labor relations supervisor.

HAROLD HOCKER, who has been connected with the Dodge truck division for several years, becomes plant engineer.

A. E. JOHNSON, vice-president and general manager of the Hastings Mfg. Co., Hastings, Mich., has been elected to the presidency of the company.

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FRED J. FISHER, for many years associated with General Motors Corp., has been elected to the board of directors of the Continental Illinois National Bank & Trust Co., Chicago.

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H. R. NORGREN has been made assistant general sales manager in charge

of special accounts for Detroit Rex Products Co. D. E. WILLIARD has been made assistant general sales manager in charge of regions and branch offices.

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G. H. JONES, first president of the Chicago Heights Manufacturers' Association and one of the founders of the Inland Steel Co., Chicago, was the guest of honor at the association's 33rd annual meeting at the Palmer House on Jan. 25. He was presented with a distinguished service scroll as evidence of appreciation for his service to Chicago Heights.

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WILLIAM K. BREEZE has been appointed Pacific Coast manager of the Jones & Laughlin Steel Corp., Pittsburgh, with supervision over the district offices at Los Angeles, San Francisco and Seattle. He will make his headquarters in Los Angeles. He has been district sales manager in New York since March, 1938, and has been identified with the company since 1929, when he started in the Cincinnati district office.

WILLIAM K. BREEZE, Pacific Coast manager of Jones & Laughlin Steel Corp.

JOHN B. DEWOLF, who has been district sales manager in Philadelphia since 1938, has been appointed district sales manager in New York. He started in the steel industry in 1918 with the old Liberty Steel Co., which was later merged into Republic Iron &

JOHN B. DeWOLF, New York district sales manager.

Steel Co. He was district sales manager in Philadelphia for Republic from 1930 to 1936 and later assistant sales manager of tin plate sales at Cleveland.

HERBERT B. SPACKMAN, for the past two years assistant district sales manager in Philadelphia, has been appointed district sales manager of that office. He has been in the steel industry since 1923, having started with the Bethlehem Steel Co. and served in various sales capacities in Bethlehem, Buffalo and Philadelphia, before going to the Jones & Laughlin company.

HERBERT B. SPACKMAN, district sales manager of the Philadelphia office.

DAVID C. SPOONER, JR., who has been associated with General Electric Co. appliance activities for more than 20 years, has been placed in charge of the newly formed pioneer products section of that division. H. A. COOK, assistant commercial engineer for the wiring materials, has been named manager of the new miscellaneous construction material sales section.

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WALTER M. HUTCHISON, who has been sales promotion manager of the Westinghouse lighting division at Cleveland since 1937, has been made manager of agency market development for the Westinghouse Electric & Mfg. Co.

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EDWIN C. JARM, formerly with the Carborundum Co., and WILLIAM D. STARR, technical director of the Lea Mfg. Co., Waterbury, Conn., have been placed in charge of the research and technical development department for the cutlery industry by the Lea Mfg. Co.

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C. A. SMITH, formerly superintendent of the switchgear division of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been made manager of the East Pittsburgh factory service division. He has been associated with the company since 1892.

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CAPT. RALPH J. KRAUT, assistant manager, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., was one of four officers in Wisconsin selected to attend a command and staff school for National Guard and reserve officers in Chicago, Jan. 15 to 27.

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GEORGE T. HORTON, Chicago, president of the American Welding Society,

spoke on "Illustrations of Special Welded Plate Structures" at the regular meeting of the Milwaukee section of the American Welding Society at the City Club in Milwaukee, Jan. 26.

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LOUIS SCHWAB and MILTON SCHWAB have resigned as officers and have severed their connection with the Ladenson Metals Corp., Philadelphia. Simultaneously HERMAN LADENSON has withdrawn and severed his connection from the Franklin Smelting & Refining Co. and the two companies have become separate identities. Louis and Milton Schwab will devote their attention to the Franklin Smelting & Refining Co., and the operations of the Ladenson Metals Corp. will be directed by Herman Ladenson and DAVID N. and MITCHELL E. STEINBERG.

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FRANCIS H. PENN has been elected president and general manager of the American Bantam Car Co., Butler, Pa., succeeding ROY S. EVANS, who has resigned. Mr. Evans will continue as chairman of the board. Mr. Penn has been vice-president and general manager of the company for the past two years, prior to which he was general sales manager of the Hupp Motor Car Corp.

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E. A. LONGENECKER, Milwaukee industrial engineer, formerly connected with the Charles A. Krause Milling Co. and who had charge of the design and construction of its new plant, has been appointed executive vice-president of the Lauson Co., New Holstein, Wis., manufacturer of gasoline engines. He is a graduate of the University of Wisconsin and taught heat power engineering there for several years before going with Fairbanks Morse at Beloit, Wis. Later he was for five years superintendent of assembly and test department of the Le Roi Co.

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PHILIP D. REED, recently made chairman of the board of General Electric and a Milwaukeean, has been asked to address the "On Wisconsin" dinner of the Wisconsin University Alumni Club to be held in the Milwaukee Auditorium Feb. 27. Reed was born in Milwaukee and worked for several summers at Cutler-Hammer, Inc., before entering Wisconsin University and later Fordham.

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J. C. MERWIN, former vice-president in charge of the conveyor division, has been elected treasurer of Chain Belt Co., Milwaukee. He has been connected with the firm since 1907 in various capacities. He retains the office of vice-president. L. B. MCKNIGHT, sales manager of the conveyor division, has been appointed assistant to the vice-president. McKnight has been with Chain Belt since 1926 and served as secretary and sales manager for the Stearns Conveyor Co., a subsidiary of Chain Belt located in Cleveland.

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GEORGE ENGLER has been advanced from assistant treasurer to the position of treasurer of the Fremont Foundry Co., Fremont, Ohio. HARRY G. KRAUS, Cleveland Trust Co., has been elected director, filling the place left vacant by the death of A. J. Kroenke.

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GEORGE MCINTIRE has been named purchasing agent of the All-Metal Products Co., Wyandotte, Mich. Formerly he was with Kelvinator Corp. He succeeds RAY NIELSON, who has

gone with the B. F. Goodrich Co., Akron.

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HERBERT M. ORSCHEL has joined the Perolin Co., New York, as sales manager for the central division territory. Mr. Orschel was associated with Johns-Manville for many years as a branch manager, with Mohawk Asphalt Heater Co., Frankfort, N. Y., as general sales manager with Aeroil Burner Co., West New York, N. J., as field sales manager and with the American Asphalt Paint Co., Chicago, as district sales manager.

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FRANCIS LEBARON, of the E. L. LeBaron Foundry Co., Brockton, Mass., was elected president of the New England Foundrymen's Association at the 44th annual meeting on Jan. 10. He succeeds ROBERT J. NELSON.

CHARLES BUTLER, Warren Pipe Co. of Massachusetts, Inc., Everett, Mass., was elected vice-president; ARTHUR W. GIBBY, East Boston, treasurer; and ERNEST F. STOCKWELL, Barbour-Stockwell Co., Cambridge, Mass., secretary.

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CHARLES R. WEAVER, for the past four years affiliated with the Automobile Manufacturers Association on export matters, has been appointed secretary of the organization's export committee and manager of its export department. He succeeds GEORGE F. BAUER.

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DR. A. LLOYD TAYLOR, formerly director of the department of chemistry, Pease Laboratories, New York, has joined the technical staff of the Oakite Products, Inc., New York.

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HERMAN W. KRUEGER, founder of the Norcor Mfg. Co., Green Bay, Wis., has relinquished his connection with the company.

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D. P. DAVIES, vice-president, formerly in charge of tractor engineering, of the J. I. Case Co., Racine, Wis., will be vice-president and consulting engineer responsible for the testing of all new units, and in charge of the patent department. The detailed engineering work at Racine will be assigned to the tractor works and main works respectiyely, which placed it under the factory managers, the same as at Rockford, Rock Island and Burlington. Under this new arrangement, W. G. THOMPSON, manager of the tractor works, also supervises tractor works engineering.

H. F. GRISWOLD, for several years superintendent of the main works and for the past two and a half years connected with the Burlington plant in the development and management of that plant, returns to Racine as manager of the main works and in supervision of engineering activities in connection with it.

J. L. FURGUSON, superintendent of the main works, goes to Burlington as manager, and supervisor of the plant's own engineering department.

Automatic Gas-Steam Radiator Co., Brushton Avenue, Pittsburgh, has changed its name to the Automatic Gas Equipment Co., according to an announcement by G. C. Blackmore, president. Broadening of the company's line of products to include many types of heating units made the change mandatory. There has been no change in personnel. G. W. Blackmore is treasurer, and J. B. Selover, chief engineer.

This Week on the Assembly Line

(CONTINUED FROM PAGE 56)

is believed to be ready for release, however.

Claim has been made that Ford's Rouge plant cold finishing mill has set a world record for production in an 8-hr. run. The day shift on the 66-in. three-stand tandem mill rolled 902.8 tons of steel recently on a single shift. The steel was 19-gage stock, 58½ in. wide, and was scheduled for use in stamping body quarter panels. This is said to beat the previous record of 855 tons in 8 hr. set last fall at Pittsburgh. This mill installation was made four years ago.

Automatic, continuous, metered lubrication of machine tools and other mechanical equipment has recently seen application in auto plants. This is not a case of "one shot" lubrication once or twice a shift, nor does it involve use of complicated metering valves or controls. Instead it is the steady feeding of small quantities or weights of lubricant through a simple distributor. The distributing method is said to use only one-quarter to one-tenth the number of parts used in other similar systems.

A further application of the same principle is on a multiple-tapping job where 10 taps are automatically lubricated by one of these units mounted in the head of the machine.

Labor Campaign Renewed

It's a safe bet to discount a large part of the UAW-CIO statements made recently about demands which are proposed against General Motors Corp. They are regarded as "campaign platforms" for consumption by the GM workers in the many weary weeks during which NLRB elections will be held.

For almost a year the split with Homer Martin has been a factor in a stalemate that has prevented conclusive claims by any union that it alone represented GM workers. General Motors itself was a petitioner for an NLRB election to settle the matter, having filed the first employer petition of this sort ever recorded. However, the board threw that out in favor of a union petition. Acting on a CIO petition, the board now has ordered hearings on whether elections should be held in 67 GM plants to determine the exact status of the AFL union which Martin now heads. If and when such elections are held, they will extend over a two-month period, it has been estimated.

That means a lot of angling will be done because Martin obviously wants his strongholds to be among the first polled, for the psychological effects if nothing else. Thus, the CIO publicity campaign, with propaganda which promises a 32-hr. work week, as an "immediate objective." At the same time, and even more obviously a bit of stage-dressing for the elections, the UAW-CIO promises to negotiate with GM on a set of "basic demands" which include:

Thirty-hour week, 40-hr. pay; five-day week, 6 hr. day; vacations with pay; day-work wages, instead of hourly rate; complete recognition of the shop steward system, with extended time allowance for the stewards to settle grievances.

Foundry Practice Lectures at Detroit

THE Detroit Chapter of the American Foundrymen's Association will present a series of six lectures on "Fundamentals of Foundry Practices," starting on March 1 and continuing each Friday thereafter, in the chemistry lecture room at the University of Detroit, Livernois and McNichols Road, Detroit.

The lecturers will be such men as H. W. Dietert, of H. W. Dietert Co.; V. A. Crosby, of Climax Molybdenum Co.; Fred Weaver, of Great Lakes Foundry Sand Co.; L. G. Korte, of Atlas Foundry; Donald J. Reese, of the Development and Research Division of the International Nickel Co., Inc.; John A. Linabury, of Saginaw Malleable Co.; and Omer Allen, of Pontiac Motor.

The course has been arranged by the Educational Committee of the Detroit chapter, including: F. J. Walls, of International Nickel, who is chairman of the committee; A. L. Boegehold, of General Motors Research; Fred Melmoth, of Detroit Steel Castings; A. J. Herzig, of Climax Molybdenum; A. Di Giulio, of University of Detroit; E. K. Smith, of Electro-Metallurgical Co.; R. E. Schneidewind, of the University of Michigan; and A. H. Allen, of *The Foundry*.

Registration fees will be $1.50 for members whose companies are members of the A.F.A., and $2.50 for non-members.

Acetylene Association to Convene at Milwaukee

THE International Acetylene Association will hold its 40th convention in Milwaukee, April 10-12. Headquarters will be at the Schroeder Hotel. The program will include a forum on oxy-acetylene cutting of metals, a series of round table discussions, for which the association is notable, and a number of technical sessions with papers on applications of oxy-acetylene welding, cutting and heat treating. H. F. Reinhard, 30 East Forty-second Street, New York, is secretary of the association.

Pittsburgh Coke & Iron Co. reports net profit of $298,211, equal, after preferred dividend requirements, to 42c. a common share, for the quarter ended Dec. 31, 1939, compared with $111,518 or 14c. a share, for the quarter ended Sept. 30. Net income for the year 1939 was $42,759 or 70c. a share, compared with $216,773 or 19c. a share in 1938.

Ryerson Builds Large Addition to Chicago Plant

A NEW all-steel building is nearing completion at the Chicago plant of Joseph T. Ryerson & Son, Inc. The 75 ft. x 555 ft. building will increase the total floor space to well over 650,000 sq. ft. The new span with its 46,000 sq. ft. of floor space is to form part of a department now containing over 300,000 sq. ft. and will be used for storing hot rolled steel bars, shapes and plates. It will be served by two new 15-ton cranes and direct railroad sidings thus adding to the plant's shipping, receiving and handling facilities.

In addition to the new unit, an extension has been erected on a 100 ft. span in the concrete reinforcing steel section. This increases facilities for handling and racking extra long length stock. Eight protected railroad sidings at the Chicago plant permit as many as 47 freight cars to be loaded or unloaded under roof at one time without subjecting stock to the weather.

Bethlehem Bookings Set New Peacetime Mark at $538,368,398

BETHLEHEM STEEL CORP.'S bookings during 1939 set a new peacetime record at $538,368,398, exceeding every 12-month period except the war-year of 1917 when sales totaled approximately $559,000,000, and made it possible for the company to earn $5.75 per common share last year, E. G. Grace, president, reports.

Fourth quarter earnings of $13,028,928 set a new all-time mark for the company and enabled it to declare a $1 quarterly common dividend (payable March 1 to shares of record Feb. 9), and call for retirement on April 1 the entire issue of $18,677,740 of 5 per cent preferred stock.

Reflecting lower steel prices, Bethlehem's 1939 earnings were considerably lower than the 1937 total of $31,819,596. Earnings in 1938 were $5,250,239.

The company's operations averaged 98.6 per cent during the fourth quarter, against 70.1 per cent in the third quarter of 1939, and 70.8 per cent for the entire year, and compared with 43.3 per cent for the previous year. Currently Bethlehem plants are operating at 91 per cent while new business is at the rate of 50 per cent of capacity.

Inventories Not Large

"I do not look at our 50.1 per cent rate for incoming business in January pessimistically," Mr. Grace said. "We will have good operations throughout the first quarter and at least part of the second quarter. I don't believe there are large inventories of our products in the hands of consumers. When the recent buying movement began most steel consumers were down to bare floors."

The Bethlehem executive declared that steel prices are holding firmly, said scrap prices "still are on the high side," and noted that the company has no ordnance or other war material contracts from foreign countries. The percentage of the company's products exported last year was about the same as in 1938, he said, while the percentage of profit from the Bethlehem shipbuilding division was less in 1939 than in 1938. To provide for a possible decrease in raw material inventories, the company set up a reserve of $2,000,000 which has been deducted from inventory value.

14,000 More on Payroll

Bethlehem Steel employed 110,824 workers in the fourth quarter of 1939, against 96,947 in the third quarter last year and 86,352 in the fourth period of 1938, while the fourth quarter payroll rose to $49,167,235 from $39,453,382 in previous quarter and $32,955,204 in the fourth period of 1938. Fourth quarter wage payments to employees averaged 92.4c. an hour, compared with an average of 91.6c. for all of 1939 and 91.2c. for 1938. The average work week in the fourth period was 37.2 hr. against the average of 35 for the entire year of 1939 and 29.9 for the previous year.

Mr. Grace reported cash expended for additions and improvements to properties in 1939 amounted to $11,711,743, the total in 1935 to 1939 inclusive amounting to $104,681,011, while the cost of completing construction authorized and in progress as of Dec. 31, 1939, is estimated at $11,287,000.

Copper in Cast Iron

(CONTINUED FROM PAGE 43)

molten iron, particularly in the presence of aluminum or nickel. The results obtained from the use of copper are extremely uniform, and no difficulty is to be expected from this source.

Many of the copper producers and other alloy manufacturers are now marketing a copper shot of a known high purity intended primarily for foundry use. This material is recommended for spout and ladle additions to cast iron. If it is absolutely necessary to add copper to a small hand ladle, it should be stirred vigorously or re-ladled in order to insure complete solution. These precautions, of course, apply equally well to all ladle additions of alloys. In fact, the experience of many foundrymen using copper seems to indicate that copper goes into solution and into complete dispersion more readily than do most alloys. When copper scrap is used, it should be of a size compatible with the amount of iron in the ladle, the percentage being used, the temperature of the metal, and the general foundry practice. The higher metal temperatures, of course, are capable of dissolving heavier material. Unless rather high temperatures are employed or unless the amount of iron being treated is fairly large, it is undoubtedly best to use a material such as copper shot. In any event, the purity of the copper should be insured since although copper itself does not introduce foundry difficulties, some of the impurities in copper scrap may do so. A new copper alloying agent developed by the Copper Iron and Steel Development Association consists of copper, silicon, and a small amount of aluminum. It can be crushed readily to a small size and is particularly adapted for ladle use. The melting point of this material (1500 deg. F.) is also an asset in this regard. This alloy addition imparts the usual copper effects—it also has a deoxidizing effect which tends to prevent the formation of dendritic graphite and the modification of cast iron. In many cases, particularly in the lower-carbon cupola irons and electric furnace cast irons, it is possible by means of this alloy to get increases in physical properties impossible by the use of copper alone. Increases in toughness over 125 per cent have been observed in commercial practice as well as in laboratory tests, together with increases of up to 60 per cent in tensile and transverse strengths.

Copper can also be introduced into cast iron by adding it to the charge in the cupola. In this case, baled or briquetted copper scrap, fairly large chunks of copper plates, or sheared cathode copper are recommended. A fairly coarse copper wire has been used in the cupola with complete success, although this cannot be particularly recommended. Apparently the low melting point of copper, which would lead to the suspicion that it might come down prior to the original charge with which it was placed, does not have this effect if the copper is placed on top of the metal charge. Cupola and furnace additions have been wholly successful. Usually, of course, due to the foundry conditions and also to metallurgical considerations, a ladle addition is preferable, but at times the amount to be added is too great for good foundry practice.

Whether copper is added to the cupola, to the ladle, or to the cupola spout there is no loss due to oxidation.

A saving in the total alloy cost can be made by considering the amount of copper in the remelt since this is not lost during the melting process. Up to 2.5 to 3.5 per cent there is no tendency for copper to separate out of cast iron or to segregate in one spot. Instances of segregation, separation, or loss are probably purely mechanical, resulting from improper material or faulty manipulation. When copper is added to cast iron with the same care and regard used for other alloys, no trouble occurs and its benefits and economies can readily be realized by the foundryman.

Plane Output Expected To Double During 1940

THE production of airplanes and engines in the United States in 1940 should reach a value of over $500,000,000, more than twice the value of 1939 production estimated at $225,000,000, according to a report issued on Jan. 25 by Col. John H. Jouett, president of the Aeronautical Chamber of Commerce. The present reserve of unfilled orders of the aviation industry, Colonel Jouett disclosed is about $625,000,000, as compared with a backlog of $125,000,000 a year ago. Of this amount, the American air forces have about $200,000,000 of business on order.

Last year, exports of aeronautical equipment reached about $117,000,000, as compared with $68,000,000 in 1938. Besides the Allied belligerents, 89 other foreign countries were buyers of our equipment.

Although the coming year will be the greatest productive period in the history of the industry, there is not likely to be any serious labor shortage, Colonel Jouett predicted. Quantity orders for planes have permitted the adoption of so-called straight line production methods and mass production techniques, allowing much larger percentages of unskilled and semi-skilled labor to be used.

$1 Per Hr. Set as Coremakers', Molders' Wages in Newark, N.J.

AN agreement covering 1940 recently negotiated between the International Molders Union, A.F.L., and foundrymen in the Newark, N. J., area calls for $1 per hour for molders and coremakers and 53c. for laborers. These rates are the same as established in the 1939 agreement.

. . . OBITUARY . . .

WALTER TOY, president of Scott & Williams, Inc., died Jan. 25 at a Laconia, N. H., hospital. He was 50 years old.

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RUPERT G. JEFFREY, president of the Whitney Screw Co., Nashua, N. H., died on Jan. 26, aged 63 years. For several years he resided and worked in Worcester, Mass.

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DAVID M. KERR, president of Kerr Machinery Co., Detroit, died Jan. 26 at his home after a long illness. Mr. Kerr, who was 61 years old, was born in Montreal in 1878, but had lived in Detroit for 58 years. In 1906 he founded the machinery company which he headed for the manufacture of pumping equipment. Mr. Kerr also was president of the Kerr Building Co., and during the last war he served on the board of the United States Emergency Fleet Corp.

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JAMES JONES, at one time roll superintendent, South Chicago works, Carnegie-Illinois Steel Corp., died recently at Chicago. Mr. Jones retired from Carnegie-Illinois Steel Corp. several years ago and had, up to the time of his death, been a roll consultant for Continental Roll & Steel Foundry Co., East Chicago, Ind.

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WALTER A. FORBES, chairman of Gunite Foundries Corp., Rockford, Ill., died last week in Rockford on his 70th birthday. Mr. Forbes was also a director of the Mattison Machine Co., Rockford, and was formerly associated with the Rockford Malleable Iron Works. His father, the late Duncan Forbes, was a pioneer iron and steel manufacturer who established in Rockford the forerunners of the local iron concerns. A son, Duncan P. Forbes, is president of Gunite Foundries.

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FRANCIS PLYM, 70 years old, president of Kawneer Mfg. Co., Niles, Mich., metal store front manufacturing concern, died at his home in Niles, Mich., on Jan. 12. Mr. Plym founded the Kawneer company 32 years ago.

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JEFFERSON CARL WEISENBACH, foundry superintendent of the Cleveland Punch & Shear Works Co., Cleveland, died in that city on Jan. 19, aged 44 years. He had been identified with the company for the past 16 years.

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FRANK A. REUTHER, vice-president and treasurer of the Reuther Foundry Co., Harrison, N. J., died of heart disease at the Presbyterian Hospital,

Newark, N. J., on Jan. 14, aged 76 years. With his brother, Frederick, president of the company, Mr. Reuther founded the company 40 years ago. Mr. Reuther started in the industry as a molder.

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M. M. Wagner, president of the Wagner Mfg. Co., Sidney, Ohio, died at his home in that city on Jan. 18, aged 77 years. He was one of the founders of the company in 1891, and was for a time its purchasing agent and treasurer.

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J. F. Kopatzke, general foreman of the W. Toepfer & Sons Co., sheet metal manufacturer, Milwaukee, died Jan. 24 in a Milwaukee hospital following a week's illness. He had been with Toepfer 35 years until his retirement four years ago. He was 74 years old.

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Fred H. Liesegang, 70, associated with Variety Iron & Steel Co., Cleveland, for 43 years before his retirement 10 years ago, when he was plant superintendent, died Jan. 5.

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Otto Wolff, head of the former German steel works of the same name, died in Essen, Germany, after a long illness on Jan. 22, aged 59 years. The company which he founded was in the period just after the War a rival of the Stinnes group of companies.

Watchman Gets $592 For Overtime Work

MILWAUKEE — A restitution check for $592, claimed to be the largest single payment made by the Federal Wages and Hours division, was given to a night watchman of the Wisconsin Iron & Metal Co. for infractions of the law. Leo Leibowitz, owner of the concern, was under the impression his employees did not come under the regulations of the law. He also paid a small sum to five other employees for overtime.

New Pipe Nipple Standards

WASHINGTON—The National Bureau of Standards, upon the recommendation of the National Association of Pipe Nipple Manufacturers, has submitted for the approval of producers, distributers and users proposed new commercial standards for brass, steel and wrought iron pipe nipples. After sufficient written acceptance, the bureau will publish the standards together with a list of organizations which have officially accepted the recommended revisions.

. . . PIPE LINES . . .

Shell Pipe Line Corp., Shell Building, St. Louis, affiliated with Shell Oil Co., Inc., same address, has plans for new 8-in. welded steel pipe line from oil field near Salem, Ill., to Sandoval, Ill., for crude oil transmission. Line will connect at latter place with system of Illinois Pipe Line Co., which has pumping station in that area. Cost close to $150,000.

Penn-York Oil & Gas Corp., Masonic Temple, Olean, N. Y., plans pipe lines in connection with development of properties in gas field area of Potter County, Pa.; also for crude oil service in Warren County oil field district, Pa., where several new wells will be drilled. Cost close to $100,000.

Sinclair-Prairie Pipe Line Co., Gulf Building, Houston, Tex., an interest of Sinclair-Prairie Oil Co., same address, has asked bids for new 8-in. welded steel pipe line from K-M-A oil field area, Wichita County, Tex., to Hensley, Jack County, Tex., about 66 miles, for crude oil transmission. New line will form a loop with present system between these points and will be connected with pumping station of company at Hensley. Booster stations will be installed. Cost about $500,000. It is proposed to begin work this month.

Public Works Officer, Naval Station, Pensacola, Fla., closes bids Feb. 14 for pipe lines and other facilities for gasoline fueling system at local station (Specifications 9564).

San Antonio Public Service Co., San Antonio, Tex., is arranging fund of about $270,000 for extensions and improvements in gas division this year, including pipe line extensions and replacements, station equipment and other operating facilities.

Basin Pipe Line Co., Big Spring, Tex., has been chartered under State laws by C. L. McIver, Fort Worth, Tex., president, and A. L. Lipscomb, Big Spring, to build pipe line system from Wasson-Denver oil field districts, Gaines and Yoakum Counties, Tex., to Big Spring, about 108 miles, for crude oil transmission. Line will consist of 6 and 4-in. welded steel pipe, with booster stations along route; pipe line gathering system will be installed in oil field area noted. Oil will be furnished to refinery of Cosden Oil Co., Big Spring. Construction contracts have been let to Brown & Root, Inc., Austin, Tex., and O. C. Whittaker, Fort Worth, Tex., previously mentioned in these columns. Cost close to $600,000.

Board of Harbor Commissioners, Long Beach, Cal., has let contract to Bennett & Taylor, 598 San Fernando Road, Los Angeles, at $36,116.78, for six submarine steel pipe lines beneath and across entrance channel of Long Beach harbor, from east to west side of channel. Installation will be made for following interests, which will furnish pipe of sizes noted, fittings, bolts and gaskets, and other accessories: Long Beach Gas Department, two 10-in. lines; Long Beach Harbor and Water Department, two 14-in. lines; Lomita-Signal-Wilmington Associates, Wilmington, Los Angeles, one 10-in. line; and Long Beach Oil Development Co., one 8-in. line.

Inland Empire Refineries, Inc., Salt Lake City, awarded contract for construction of 320-mile crude oil pipe line between Cut Bank, Montana, and Spokane, Wash., to W. A. Bechtel Co., San Francisco, and William Brothers Corp., Tulsa, Okla., at $2,500,000.

Illinois Pipe Line Co., Oil and Gas Building, Houston, Tex., has approved plans for new 4-in. electric-welded steel pipe line from oil field district near Gladewater, Tex., to Bradford, Rusk County, Tex., about 45 miles, for crude oil transmission. Connection will be made with company pumping station and main pipe line system at latter place. Cost close to $200,000. Work will be carried out by company forces.

May Gas System, May (Brown County), Tex., Horace White, head, plans construction of new welded steel pipe line from Salt Creek natural gas area to Blanket (Brown County), about six miles, for natural gas transmission for commercial service.

United States Engineer Office, Memphis, Tenn., asks bids until Feb. 9 for 19 lengths of 32-in. dia. steel pontoon pipe, each length 52 ft. (Circular 191-F).

Republic Light, Heat & Power Co., Jackson Building, Buffalo, plans steel pipe lines for development of natural gas properties in gas field area in northern part of Chautauqua County, N. Y., where number of new wells will be drilled. Work is scheduled to begin soon.

Colorado Springs, Colo., Earl L. Mosley, city manager, plans new 30-in. pressure pipe line for water supply from Manitou hydroelectric generating station to point near Bell Crossing. Proposed to begin work in February. Cost about $125,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 12 for about 215,320 ft. of galvanized steel pipe, and for 7400 ft. of black welded steel pipe (Schedule 3880).

Salem, Ill., plans pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other operating facilities. A bond issue of $150,000 is being arranged for project.

Constructing Quartermaster, Chanute Field, Rantoul, Ill., asks bids until Feb. 20 for installation of pipe lines and other facilities for a gasoline fueling system at local field (Circular 6627-72).

United States Engineer Office, Jacksonville, Fla., closes bids Feb. 2 for 10 lengths of 12-in. seamless steel discharge pipe, with cast iron flange welded on each end of pipe; two lengths of similar pipe, with cast iron flange welded on one end, and one-half oval band welded on other end (Circular 349).

CAST IRON PIPE

Sour Lake, Tex., plans pipe lines for water system and other water-works installation. Bond issue is being arranged for this and new sewage disposal works. H. L. Thackwell, Longview, Tex., is consulting engineer.

Shiner, Tex., plans water pipe line system and other water-works installation. Fund of about $70,000 is being arranged for this and other municipal improvements. J. J. Rady, Majestic Building, Fort Worth, Tex., is consulting engineer.

Bedford, Iowa, closes bids on Feb. 10 for pipe line extensions and replacements in water system, also improvements in water-works station. Cost about $36,750. Stanley Engineering Co., Muscatine, Iowa, is consulting engineer.

Woodruff, Wis., plans pipe lines for water system and other water-works installation. Fund of about $59,000 is being arranged for this and sewage system.

Waverly, Mo., has plans for water pipe line system and other water-works installation. Fund of about $100,000 has been arranged for this and sewage system, for which bids will be asked at same time. Harrington & Courtelyou, Dwight Building, Kansas City, Mo., are consulting engineers.

Huntington, Tex., plans pipe lines for water system and other water-works installation, including 50,000-gal. elevated steel tank and tower and water-treatment plant. Bond issue for $30,000 has been authorized. M. C. St. John, 4101 Polk Avenue, Houston, Tex., is consulting engineer.

Pasco, Wash., Adah Perry, city clerk, asks bids until Feb. 1 for 400 ft. of 8-in. pipe, 5000 ft. of 6-in., and 500 ft. of 4-in.; also cast iron crosses, tees and other fittings. D. W. McGhee is manager of water department.

Nortonville, Kan., closes bids Feb. 8 for pipe for water system and other water-works installation, including 50,000-gal. elevated steel tank and tower. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Seguin, Tex., has secured fund of $145,000 through Federal aid for pipe lines for water system and other water-works installation, part of appropriation to be used for sewage system. W. J. Miles, Seguin, is engineer.

Inglewood, Cal., bids show National Cast Iron Pipe Co., Los Angeles, low bidder on 490 tons of Class 250 6 and 8-in. pipe.

Pasco, Wash., opens bids Feb. 1 on 4, 6, and 8-in. cast iron pipe and accessories.

Seattle, Wash., has opened bids on 2196 ft. of 16-in. cast iron cement lined pipe.

Board of Awards, Municipal Office Building, Baltimore, asks bids until Feb. 7 for quantity of cast iron pipe and fittings for Bureau of Water Supply. Leon Small is water engineer.

Summerfield, Kan., plans pipe lines for water system and other water-works installation. Fund of $37,000 has been arranged through Federal aid and work will begin soon. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., and Public Utilities Building, Salina, Kan., are consulting engineers.

Bloomington, Ind., plans pipe lines for extensions in water system and other water-works installation for increased supply. Greeley & Hansen, 6 North Michigan Avenue, Chicago, consulting engineers, have been retained to make surveys and estimates of cost.

Tulsa, Okla., has approved plans for new 24-in. main supply line in South St. Louis Street, from Second to Twenty-first Street. Also proposed to construct a new 2,000,000-gal. capacity steel standpipe in vicinity of State Fair Grounds. Work is scheduled to be carried out soon. W. F. McMurry is city water superintendent.

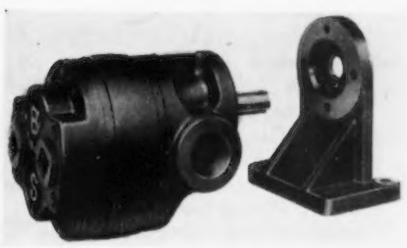
Mount Airy, N. C., plans extensions in pipe lines for water supply for Mount Airy Country Club and residential section in that area. Cost about $25,000.

Manawa, Wis., plans pipe lines for water system and other water-works installation. Cost close to $200,000. Financing is being arranged through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Oklahoma City, Okla., W. A. Quinn, city manager, plans extensions in pipe lines for water system. Cost close to $1,162,000. Special election has been called on Feb. 20 to approve bond issue of $6,911,000 for this and other water-works expansion and improvements, including pumping station and filtration plant to cost $1,098,000; new water reservoir and dam at Upper Bluff Creek, cost $4,345,000; and improvements in water supply source at Lake Overholser, $306,000. M. B. Cunningham is city engineer.

Highlands, Tex., will begin work soon on pipe lines for water system and other water-works installation. Bond issue of $105,000 has been approved for this and sewage system. H. G. Olmstead, Galveston Road, Houston, Tex., is consulting engineer.

SERIES 500 Brown & Sharpe rotary geared pumps, with hydraulically and mechanically balanced herringbone gears, are available for sale throughout the world. In the original description of this new series of pumps that appeared on page 43 of the Nov. 30, 1939, issue the statement was made in error that the pumps are sold in the United States only. These pumps are offered in six sizes with output capacity from 5 to 37 gal. per min. Maximum pressure is 500 lb. per sq. in. Needle bearings on both shafts, ground joints without gaskets, self-balancing seal on the drive shaft and the use of heat-treated gears separate from the shafts are some of the features of the line. The foot mounting is optional.



. . . THE NEWS IN BRIEF . . .

Automobile assemblies decline slowly. Steel purchases expected during February.—**Page 54.**

William Green denounces NLRB for "outrageous" delays; car company reports it was "slugged" by board into settlement.—**Page 58.**

Richberg cautions automobile dealers against inviting Government regulation of their business.—**Page 60.**

Government iron and steel contracts for week ended Jan. 20 total $934,502.—**Page 60.**

National Canners' Association told of progress in canning industry survey.—**Page 60.**

National Association of Manufacturers warns against development of war psychology in U. S.—**Page 60.**

Canada announces program for purchase of ships and aircraft to cost about $32,500,000.—**Page 62.**

Canada's 1939 output of steel ingots and castings totaled 1,384,827 tons.—**Page 62.**

Canada places pig iron, steel and other items under export licensing system.—**Page 64.**

Canadian war contracts total $2,000,000 in week.—**Page 64.**

British and French purchasing commissions combine their offices at 15 Broad Street, New York.—**Page 65.**

Fourth quarter freight car loadings increased 16.3 per cent above 1938 period.—**Page 66.**

Bolens Mfg. Co., Port Washington, Wis., acquires property of Gilson-Bolens Mfg. Co.—**Page 66.**

SWOC loses election to independent union at Pressed Steel Car Co. plant.—**Page 66.**

California Conference of Iron, Steel and Allied Industries to be held Feb. 8-10.—**Page 67.**

Westinghouse Electric & Mfg. Co. exhibits atom smasher at East Pittsburgh plant.—**Page 67.**

International Harvester Co. introduces three new models of crawler-type tractors.—**Page 67.**

American Foundrymen's Association, Detroit chapter, to present series of six lectures on foundry practice.—**Page 75.**

Joseph T. Ryerson & Son, Inc., builds large addition to Chicago plant.—**Page 75.**

International Acetylene Association to hold 40th convention at Milwaukee April 10-12.—**Page 75.**

Aircraft production in the U. S. is expected to double to valuation above $500,000,000 in 1940.—**Page 78.**

One dollar per hour set as coremakers', molders' wages in Newark, N. J.—**Page 78.**

Watchman gets $592 for overtime under Federal wage and hour law.—**Page 80.**

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MEETINGS

Feb. 5—Engineers Society of Western Pennsylvania, annual banquet, Pittsburgh.

Feb. 8 to 10—Conference of Iron, Steel and Allied Industries, Del Monte, Cal.

Feb. 12 to 15—American Institute of Mining and Metallurgical Engineers, annual meeting, New York.

Feb. 14 to 16—Association of Highway Officials of North Atlantic States, Atlantic City, N. J.

Feb. 15 and 16—Wisconsin Chapter, A.F.A., and department of mining and metallurgy, University of Wisconsin, regional conference, Milwaukee.

March 7 to 9—American Society of Tool Engineers, annual meeting, New York.

March 14 and 15—Society of Automotive Engineers, national aeronautic meeting, Washington.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 23—American Iron and Steel Institute, annual meeting, New York.

National Bureau of Standards offers new standards for brass, steel and wrought iron pipe nipples.—**Page 80.**

Sweden sends government trade delegation to U. S., may open buying office in Washington.—**Page 86.**

Insurance companies face U. S. regulation already in effect for railroads, Pittsburgh Traffic Club is told.—**Page 86.**

Basing points benefit steel consumers, B. F. Fairless tells TNEC; inquiry into steel industry is concluded.—**Page 87A.**

Basing point critics disregard economic facts, United States Steel Corp. tells TNEC.—**Page 87E.**

Pontiac Pattern & Engineering Co. installs equipment to make nickel-chromium alloy cast iron.—**Page 87H.**

Exhibitors' space increased at 5-day heating and ventilating exposition.—**Page 87H.**

The Galvanizers Committee will hold its annual spring session April 11-12 at Pittsburgh.—**Page 88.**

Illinois manufacturers seek to upset Southern freight rate case.—**Page 90.**

New contracts for structural steel closed in 1939 were 103.9 per cent of 1938 total.—**Page 105.**

U. S. Steel quarterly income $28,835,282.—**Page 105.**

No check-off, closed shop in Crucible SWOC contract.—**Page 105.**

Need for increased highway construction cited.—**Page 105.**

U. S. steel ore sale focuses attention on other raw material.—**Page 105.**

Crucible Steel Co. of America opens new branch and warehouse at St. Louis.—**Page 107.**

Union Metal Mfg. Co., Canton, Ohio, acquires Chicago piling company.—**Page 108.**

Union Electric Co., St. Louis, announces $21,000,000 construction and improvement plan.—**Page 108.**

Australia to buy machine tools in the United States for new automobile plant costing about $6,000,000.—**Page 108.**

Photo shows the Super-Diamond Pattern of "A.W." Rolled Steel Floor Plate. Provides completely safe tread from any angle, under any condition.

Floor troubles ended for good . . . Wherever floors do double duty—traffic aisles, stair treads, railroad running boards and platforms, car steps, truck body floors, engine rooms, catwalks, refinery towers—"A.W." Rolled Steel Floor Plate helps to prevent dangerous and costly slips and falls. Reduces maintenance to a minimum. With "A.W." Floor Plate, there are no worn and slippery surfaces to endanger men on foot or upset floor trucks. Write for folder giving complete engineering data.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal—A. C. Leslie & Co. PRODUCTS INCLUDE—Steel Products in Carbon, Copper or Alloy Analyses : : Sheared Steel Plates : : Hot Rolled Sheets and Strip : : "A.W." Rolled Steel Floor Plates : : Billets, Blooms and Slabs : : "Swede" Pig Iron : : Reading Cut Nails.

Insurance Companies Due for U.S. Control, Industry Is Told

PITTSBURGH — Insurance companies in the United States face Federal regulation similar to railroad control for the past several years, Thomas I. Parkinson, president, Equitable Life Assurance Society of the United States, told more than 1800 railroad and other industrialists at the 39th annual dinner of the Traffic Club of Pittsburgh last week.

Mr. Parkinson urged political action and a united stand by the nation's industrial and financial leaders in an attempt to eliminate this usurpation of power by the Federal Government. "We cannot depend upon the courts now and, specifically, we cannot depend upon the Supreme Court of the United States," he said.

Earlier, Mr. Parkinson had declared that the Government had failed to solve or help the railroad problem because it was afraid of labor influence and the possible political consequences of a forthright solution.

J. L. Perry, president, Carnegie-Illinois Steel Corp., was toastmaster at the Traffic Club banquet and Carl W. Sunderbrink, Pittsburgh & Lake Erie Railroad, was chairman of the annual dinner committee. Officials attending the meeting included high ranking officers of the nation's railroad, steel industry, and other key groups.

Sweden Sends Buying Organization to U. S.

A SWEDISH Government trade delegation, headed by Assar Gabrielsson, head of the Volvo Co., largest Swedish automobile manufacturer, and Prince Bertil, third son of Crown Prince Gustaf Adolf, arrived in New York last week and is considering the opening of an office at Washington for purchase of machine tools and raw materials such as cotton.

Secretary of the delegation is Carl Axel Wastfelt. Others in the group are Gunnar Hagglof, chief of the trade department of Sweden's foreign office, and Rear Admiral Nils Wijkmark.

The Pittsburgh Crucible Steel Co., Pittsburgh, with mills at Midland, Pa., has appointed Williams & Kilsby as exclusive Pacific Coast representatives for the sale of its products in California, Oregon, and Washington. Williams & Kilsby have offices in the Standard Oil Bldg., Los Angeles.

Basing Points Benefit Steel Consumers, Fairless, Adams Testify

WASHINGTON — The Temporary National Economic Committee brought its inquiry into the steel industry to an end Tuesday with another blast by the Federal Trade Commission against the basing point system. The commission wound up its attack on the steel industry before the committee in the same manner last March. The final steel witnesses were B. F. Fairless, president, and A. C. Adams, vice president, of the United States Steel Corp., who vigorously defended the basing point system in the face of a sharp attack by Chairman Edwin L. Davis, Attorney Walter B. Wooden and Economist Willis J. Ballinger of the commission. Examination of the steel executives was concluded Monday.

Mr. Fairless and Mr. Adams denied that the system is a price fixing medium and said that it does not result in high prices. Instead of stifling price competition, they contended, it extends the benefit of such competition to all consumers. It was pointed out that the practice has evolved over a period of more than half a century.

Legislation Is Requested

The FTC, concluding its steel basing point presentation, told the TNEC Tuesday afternoon that "no more vitally needed legislation within the scope of the committee's functions can be suggested than that of directly prohibiting the basing point system by Congressional mandate." It concluded that "the basing point in the steel industry is the negation and frustration of price competition."

The hearings just ended began in March, 1939, when the FTC opened its attack against the basing point system and, reflecting its traditional stand, the commission recommended a substitution of an f.o.b. mill system. The second of the series of hearings was held last October and November with a long list of witnesses from the iron ore and steel industries testifying. At the final hearings which started Jan. 16 only Steel corporation witnesses appeared on behalf of the industry. They introduced the corporation's voluminous reports in various aspects of the steel industry —reports which were characterized by the members of the TNEC as the most elaborate studies ever made of the industry. The studies, extending over a period of 18 months, were made by the Steel corporation under the direction of Dr. Theodore O. Yntema of the University of Chicago. They embraced elaborate research on prices, costs, demand, distribution and the basing system and pointed up a well-rounded economic survey such as never before was undertaken.

Hearings On Three Phases

The concluding hearings dealt with three general phases, prices and costs; distribution, and the basing point system.

Respecting prices and costs the Steel corporation, speaking through Dr. Yntema, took the position that demand for steel is determined to only a minor extent by price and that primarily volume is affected by general business activity, consumers' income and industrial profits. Holding to an insistent view of administration advisers, this attitude was attacked by government economists, two of them, rather surprisingly, being chosen from the Department of Agriculture and one from the Works Progress Administration. Broadly it was their contention that as the price decreases, the volume increases. There were frequent mild clashes between government economists and Dr. Yntema. This phase of the hearings was under the direction of Dr. Theodore J. Kreps of Stanford University.

"More Honored In Breach"

Dr. M. G. de Chazeau of the University of Virginia, temporarily attached to the Department of Justice, presented a study on distribution based on returns from two questionnaires which the department sent steel companies. This compilation laid the groundwork for the discussion of the basing point system. In the course of his remarks, Dr. de Chazeau said that the distribution study, at least in so far as it affected the period covered, indicated that "the basing point formula of prices seemed to be honored more in the breach than in observance." On the basis of a survey of prices and distribution for February, 1939, Dr. de Chazeau said many important steel producing areas would have had to curtail production sharply if all consumers were supplied by the steel company nearest them.

Dr. de Chazeau also participated prominently in the discussion of the Steel corporation's statistical anlysis when the hearings opened on Tuesday of last week. He declared that it was not his purpose to unduly criticize the analyses but rather to point out "certain limitation as to the significance" of Dr. Yntema's findings.

King Paces the Floor

In a lengthy dissertation so highly technical that Senator William H.

Business Facts Vs. Econometrics

PUNCH drunk from and sunk in oceans of technical language that flowed from economists, members of the TNEC and spectators at the steel hearings got a kick out of a crack made by A. H. Feller, Department of Justice Attorney, at the conclusion of the Thursday morning session.

"The late Justice Holmes once said that a page of history is worth a volume of logic", observed Mr. Feller with a smile. "To paraphrase him, I think it might be said that a page of business facts is worth a volume of econometrics."

Applause broke forth from some members of the committee, and laughter from onlookers.

King, committee member who opposes much of the TNEC's multifarious activities, paced the floor wating for the conclusion, Professor de Chazeau declared that the most important limitation on the Yntema studies is "the narrow significance that may rightly be accorded it for the purposes of pricing policy." Specifically, he took exception to the Steel corporation figures covering the relation of recorded expense to volume of sales, insisting that the data may reflect managerial policy rather than actual cost. Likewise, he objected to what he called a probable error in the adjustment of payrolls and other expense related to 1938 conditions, and the average mill-cost units called "weighted tons." It was his complaint that the assumptions that must be made to justify the use of the weighted tons are "so improbable as to throw doubt on the conclusions derived."

Timing of Price Changes

In explanation of his point that a 10 per cent price reduction in a certain period might have an entirely different effect as contrasted with a similar reduction in a different period, Professor de Chazeau added:

"The time of price change and the responsiveness of the price of steel to other factors in the total market situation cannot be ignored without invalidating the measure of demand elasticity derived. It seems almost self-evident that no business man could neglect with impunity the importance of the timing of his price changes. By the same token any average measure of demand elasticity which abstracts from it must prove an erroneous criterion of pricing policy."

After several interchanges between the witness and other members of the committee during which the terms "price elasticity," "short-run inelasticity in demand," "variables" and "cross elasticity" predominated, Senator King threw up both hands.

"I wonder," he said, "if we aren't dealing with a lot of theoretical and impractical matters about which the average man doesn't know anything about and much less cares."

"I hope that isn't the case, Senator," Professor de Chazeau responded.

After warning that the committee ought to confine its functions to the bounds fixed by Congress, the Senator admitted he was unable to understand "all this economic discussion," indicating that if the committee should get "down to earth" it would be worthwhile and highly refreshing.

Senator King and Professor de Chazeau clashed again later in the session when the Senator inferred from a prepared statement read to the committee that de Chazeau was advocating bureaucratic control over industry. The witness denied that the Senator's interpretation of his remarks were correct.

Professor de Chazeau said he urged the committee to work for the establishment of a permanent Federal agency empowered to collect price, sales, costs and investment information from basic industries in order to devise "criteria of desirable and possible price changes" and to coordinate the work with other governmental agencies concerned with public utility investment schedules and central banking policy.

Steel Men Knew Beforehand

In his reply to Dr. de Chazeau, care was taken by Dr. Yntema to point out that the studies were not made with any idea of providing the United States Steel Corp., or the steel industry with a formula which could be used as a basis for price policy.

"As a matter of fact, steel men were well aware of the characteristics of the demand for steel and the behavior of costs long before we began this study," said Dr. Yntema. "We have merely applied the methods of statistical and economic analysis to the facts and presented our findings to the committee in the simplest way we could.

"Our objectives in the analysis of demand and cost were simply these: first, to ascertain approximately how the quantity of steel sold by the industry responded to changes in price: and, second, to discover how costs varied with output from the data which were available to us. We have presented these findings to the committee in the hope that they may throw some light on the possibility and limitations of increasing steel consumption by reducing price and on the extent to which such price reductions could be borne by a company such as the Steel corporation."

Conflict of Interests

Near the conclusion of his testimony, Dr. de Chazeau said that if our "analysis of demand reflects faithfully the business man's criterion of desirable price, he had dramatized the conflict of private and social interest in pricing policy, which is the fundamental issue before the Temporary Economic Committee."

"In the first place," he continued, "there was never any implication on our part that our analyses reflected or had anything to do with the business man's criterion of desirable price. In the second place, and more important, the phrase 'conflicts of private and social interest in pricing policy' requires further clarification. In an economic system of private enterprise, each business seeks, and ought to seek, to make the largest possible profit in the long run. I suppose that most business men would like to get a higher price for their products than they do, and I think it is probably safe to say that it would not be in the general social interest for them to obtain as high a price as they would like to get. If this is merely what is meant by the conflict of private and social interest in pricing policy, it is an empty phrase. The real question is whether the price level in a particular industry is such as to warrant concern for the social interest."

Dr. Yntema said that there seemed to be some question as to why the steel industry did not charge higher prices for their products if they could thereby so obviously reduce their losses and increase their profits. Certainly, he said, it is not because the steel companies do not want to raise their profits from the levels which have prevailed over the past 10 years. The situation, it was pointed out, can only be explained by the fact that the forces of competition are great enough to keep individual companies from raising their prices.

The Professors May Continue

Concerning confusion between the elasticity of demand for the industry and the elasticity of demand for an individual firm Dr. Yntema said he wanted to make it clear that the estimates made referred only to the relation between the total quantity sold by the industry and the price of steel. He told Dr. Kreps that the estimates made no attempt at "cross elasticity" —demand on a single company. The term, however, was described as vague in the absence of a clear explanation of its details.

After some fencing between Dr. Kreps and Dr. Yntema over factors taken into account with respect to costs on which Dr. Kreps was told it was not assumed that all things "stayed constant" Senator King again became exasperated at what to the layman was the flow of nebulous technical terms.

"Are you sufficiently pragmatic or realistic," he asked, "to admit that a

company finds at the end of the month whether or not it is in the red?"

"I do not only admit it; I know it," responded Dr. Yntema with a smile.

"The professors may continue," said the Senator as he again settled himself comfortably in his chair.

In the course of a discussion of the relation between price and demand Dr. Yntema was asked by Attorney Walter B. Wooden of the Federal Trade Commission if price has only a mild effect on demand. Dr. Yntema replied that changes in price are less in the amount of steel sold than in other factors, such as costs, etc.

Criticism of indexes presented by the Steel corporation brought from Dr. Yntema the declaration that he would "stack" them against indexes used by any statisticians. Dr. de Chazeau commented that the validity of indexes depends on the use to which they are put. Senator King interpolated that the importance lies in the results of activities showing whether a concern makes or loses money.

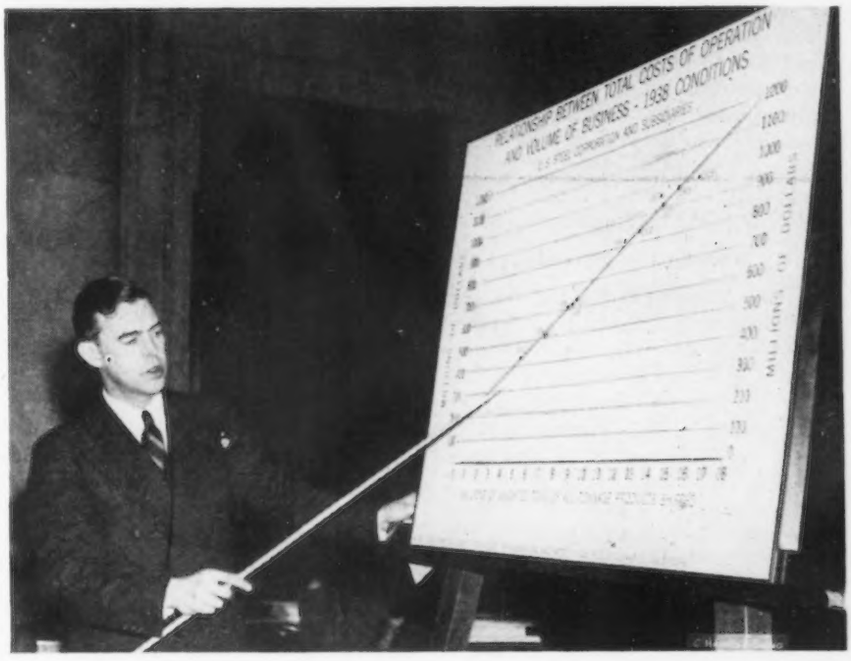
Reduction Improbable

John V. W. Reynders, a consulting engineer, Department of Commerce TNEC representative, returning to the testimony of Dr. de Chazeau, examined the latter further concerning his views on the effect of a per cent price reduction in steel. Mr. Reynders said he did not want the impression to get abroad that a 20 per cent reduction was in the range of probability, pointing to fixed costs as a deterrent in this direction.

"If you say the Steel corporation could not make a reduction of 20 per cent without taking a loss, I agree," replied Dr. de Chazeau, "but that doesn't mean a 20 per cent cut could not be made on a given product."

Questioned at some length concerning the most efficient size of a steel unit, Dr. de Chazeau said there were others better qualified than he to testify on the subject. He pointed out, however, that any integrated plant is likely to be of a large size.

From the WPA also came a Government attack on the Steel corporation cost estimates. In an exhaustive disquisition, Martin Taitel, senior consulting economist of this relief agency, and a former student of Dr. Yntema, said that he regarded the "theoretical calculations submitted by the United States Steel Corp. analysts * * * as highly interesting applications of refined econometrics, but of little use to the committee as a description of the actual considerations upon which steel price decisions are based." He maintained that the kind of cost-volume relation which the Steel corporation derives is not the one relevant to price decision-making under actual operating circumstances. The conclusion, it was said, is not that the Steel corporation does not have to reckon with its money costs. What he called the arbitrary nature of the location of costs as between years or over portions of the output was said by Mr. Taitel to "make it impossible for particular cost-volume computations such as the Steel Corporation has presented to be the all-important basis of decisions as to prices."



DR. THEODORE O. YNTEMA (above), a University of Chicago economist representing the United States Steel Corp., told the TNEC in hearings at Washington that steel prices could not be cut materially unless there were great reductions in wages, and declared demand for steel is determined to only a minor extent by its price.

Nebulous Relation

Mr. Taitel declared that a division between fixed and variable costs obtained from a statistical analysis of historical data, "such as the Steel corporation has made, bears but a nebulous relation to the actual division of fixed and variable costs which bears upon a particular act of pricing." He proceeded to say the question may fairly be raised whether the Steel corporation has ever before had prepared for the guidance of its executives cost analyses of the type presented to the committee for the purpose of helping those executives solve their pricing problems.

"And I am led to believe," he added, "that the corporation's cost analysis is not a description of what in fact has guided its pricing policy but is a rationalization of the actual pricing policies pursued by the corporation in the past."

Iron Age Graph Cited

Early in his statement Mr. Taitel said that any cost accountant or statistician working with cost figures can attain a variety of cost-volume relations by varying the methods of computing or stating costs. He said: "This is strikingly illustrated by the sharply contrasting results obtained by THE IRON AGE and the United States Steel Corp. Mr. T. W. Lippert, metallurgical editor, THE IRON AGE, presents in this year's Jan. 4 issue of that journal, a production-profit curve based upon his examination of 'production-profit data of two large steel companies—both integrated producers and both makers of practically all types of steel, from fine wire to structural shapes and including low alloy steels.' The results presented differ from the comparable results of the corporation's analysis.

"The corporation's analysis purports to show that profits vary directly with output; namely, the addition to profit is the same for each additional ton of steel sold. Mr. Lippert's analysis, on the other hand, purports to show that the relation between profits and production is decidedly not of

this direct character but that changes in output produce profits of varying magnitudes, depending upon the rate of capacity at which plants are operated. According to his analysis, the rate of profit per additional ton of output increases rapidly between the break-even point—roughly 45 per cent of capacity—and about 80 per cent of capacity. Above the 80 per cent level there is only a very small profit per additional ton of output until a rate of capacity somewhere around the 90 per cent level is reached, after which a loss is associated with each additional ton to full capacity. Furthermore, according to Mr. Lippert's study, below the break-even point losses increase very slowly as operations are reduced to about 20 per cent of capacity and then increase sharply as the operating rate approaches zero."

Doesn't Understand

On the Lippert study, Dr. Yntema complained that there was no description of what the price means. Replying to a question from Isador Lubin, Labor Department commissioner of labor statistics, Dr. Yntema said he had no information as to the basis used for the compilation, adding, "I don't understand it and I don't think the committee understands it."

For some statistical information, Dr. Yntema said, THE IRON AGE is excellent, but as for very technical data contained in individual articles, he "reserved" the right not to commit himself. He reiterated that he did not question the competency of the writer but that he just did not understand the figures used.

"Now you can see how this committee feels about your figures," put in Dr. Theodore J. Kreps, chief economic analyst for the TNEC.

While the presentation of the WPA economist was characterized by Dr. Yntema as "a scholarly approach," the Chicago University professor expressed the opinion that it "did not alter the applicability of the Steel corporation's study. Dr. Lubin sought to elicit from Dr. Yntema an admission that in proceeding with the steel cost study certain arbitrary allocations had to be made and that if the same job had been done by another economist, the results might not have agreed with Dr. Yntema's conclusions. This was conceded by Dr. Yntema to the extent that he said a more comprehensive picture in his opinion might have been obtained with more patience, more time and money.

It was Dr. Yntema's observation in defense of his study that the figures presented are valuable to show on the demand side how the total amount of steel sold varies with price; and how the corporation's costs varied with output in an effort to discover the possibilities and effects of price reductions.

An unnamed vice president of a large corporation recently told Dr. Lubin, he said, that he did not know what "a proper price" was nor how it could be arrived at. Without resorting to the vernacular of an economist, Dr. Yntema replied:

"The proper price is the one you can get in a given competitive picture."

Department of Agriculture Economic Adviser Mordecai Ezekiel, whose appearance before the committee puzzled many observers, testified that there are many weaknesses in both the accounting methods and the statistical techniques used in reaching some of Dr. Yntema's conclusions, and that even if the statistical analyses were correct the conclusions reached "do not necessarily follow."

Replying to criticisms of Dr. Louis Bean, another Department of Agriculture economist, who challenged the Steel corporation contention that the demand of steel is determined to only a minor extent by price, Dr. Yntema said that the criticisms were "of extremely dubious validity." Dr. Bean endeavored to prove that the relation between price and volume is inverse—that is, as the price decreases the volume increases. Dr. Yntema declared that the Department of Agriculture economist had neglected almost entirely the main line of the Steel corporation argument and concentrated his attention on secondary evidence.

Defects In Methods

Dr. Bean's attack was made on the Steel corporation's analyses of the demand for steel in the container, automobile and railroad industries and for all industries combined. He said that there are defects in "methods of analysis as well as in assumptions and data."

Justice Department Presents Steel Distribution Data to TNEC

WASHINGTON — Laying the basis for the Federal Trade Commission's inquiry into the basing point system, the Department of Justice, through Prof. M. G. de Chazeau of the University of Virginia, presented a compilation on the distribution of steel before the Temporary National Economic Committee last Friday. Dr. de Chazeau made only general conclusions and no recommendations. Remarks directed at Dr. de Chazeau by Attorney Walter B. Wooden gave color to reports that the commission is irritated that its hostility toward the basing point system was not reflected in the department's study and comment. The department took no stand either for or against the system.

"As such (a 'market fact'), it must be reckoned with and, given the actual location of mills and groups of mills must seek business further afield than lowest transportation costs permit," said Dr. de Chazeau, speaking of his presentation. "This situation may be consistent with maximum efficiency and lowest over-all cost or it may represent a fundamental maladjustment of capacity. The judgment must rest on other evidence."

He then said that further material was in charge of the commission.

Mr. Wooden, evidently speaking for the record in order to show that the commission was not responsible for the compilation, inquired of Dr. de Chazeau whether or not the commission's part was only that of cooperating in preparing a questionnaire rather than the actual preparation of figures.

Dr. de Chazeau replier that the commission aided chiefly in preparation of one questionnaire, and explained that analyses of the returns made by steel companies were made entirely by the Department of Justice.

In one of his most pointed references to the basing point system, Dr. de Chazeau said that a comparison of base prices with published base prices indicates that "the basing-point formula of prices seemed to be honored more in the breach than in observance during the period," February, 1939. To some extent he dwelt on price cutting.

The Department of Justice material was based on returns from steel companies in response to two questionnaires—Form A and Form B. The former was restricted to tonnage of shipments only on 18 products in 1936, 1937 and 1938. Form B covered prices and shipments in February of last year. It first ascertained in connection with Form A from most companies of any size, some 57 in all. Dr.

de Chazeau said, how shipments were recorded. Twelve of the larger companies, which maintained machine tabulating systems and using punch cards on which both state and county of destination were punched, reported shipments by states and also by the 64 consuming districts used for Form B analysis. Sixteen companies reported on a state basis only and 11 other companies reported by sales districts.

Data on Each Plant

In Form B, with its invoice analysis, in addition to tonnage shipped into each consuming district, each reporting company recorded for shipments into each district totaled delivered value, freight from basing point to destination, freight paid or allowed from point of shipment to destination and extras included in the delivered value. Separate reports were required for each plant and each of the 10 products dealt with in this particular questionnaire for each basing point on which price was computed. For all 10 products there were roughly 175 plant-product reports for 55 companies in all. Because of what Dr. de Chazeau called "grave limitation of staff," it was possible to complete the analysis for selected classifications of only six out of the 10 products reported on Form B. Two of these, sheet and tinplate bars and cold rolled sheets, have not been finally checked and were not presented. A complete breakdown was shown only on heavy shapes, plates, hot rolled sheets and hot rolled strips.

The primary object of the Form B study was said to be to provide a factual answer to many questions which have been raised with regard to the effects of the basing-point system of pricing in the steel industry.

Dr. de Chazeau said that from this point of view, it was considered both unnecessary and unwise that the Department should encroach on that part of the investigation reserved for the Federal Trade Commission, relating to the social or economic desirability of a basing point system of pricing as compared with any other pricing system. It was declared that although the study provides a more accurate statistical measure of the relative importance of certain contentions with respect to pricing practices of the steel industry under the basing point system, the underlying conditions are so complex that it cannot be considered definitive.

Nine Conclusions Offered

Subject to limitations with which he said he would not burden the committee "at this time," Dr. de Chazeau ventured the following nine conclusions:

"1. With the change in the basing-point structure in June, 1938, it may be said that, for these four products, it is generally well adapted to the location of capacity in the industry, especially for shapes and plates, less so for sheets and strips. Located at base or within 25 miles of base is capacity varying from 58 per cent for sheets to 85 per cent for shapes; within 50 miles, from 78 per cent for sheets to 96 per cent for shapes.

"2. The geographical distribution of the products in February, 1939, may be considered fairly typical for the industry as indicated by similar distribution during the calendar years 1936-37-38. Total shipments of reporting plants in that month varied in general conformity with their relative capacity.

"3. Out of the 64 consuming districts, those receiving 2 per cent or more of total shipments varied from 12 for strip to 18 for plates but accounted for from 66 per cent of all shipments in shapes to 89 per cent in strip. This shows not only a concentration of shipments but justified the use of such selected areas for more detailed analysis.

"4. Producing areas for which shipments to selected consuming districts averaged the lowest freight absorption per ton accounted for a substantial proportion of the total receipts of those consuming districts, 62 and 50 per cent for shapes and plates, and 34 and 41 per cent for sheets and strips at an adjusted freight absorption varying from 14c. per ton for plates to a 'phantom' freight of 92c. for strip. The percentage of the market thus served is probably understated because of the size of consuming districts with reference to the location and volume of shipments by some of the producing areas showing lowest freight absorption.

"5. A comparison of computed base prices with published base prices indicates that notwithstanding possible error in the averages, the basing-point formula of prices seemed to be honored more in the breach than in observance during the period.

"(a) Price cutting, thus revealed, appeared to be more prevalent and more drastic in sheets and strips than in plates and shapes, perhaps partly because of uncompleted contracts for the former made when prices were slashed for a short time during the fall of 1938.

"(b) Especially noteworthy for shapes and plates, was a tendency for the home plants in important producing areas to be responsible for the lowest computed base prices in their own areas even when they did not cut prices drastically in each other's areas (Chicago, Pittsburgh, Eastern Pennsylvania).

"The explanation of this phenomenon is probably to be found in part in the fabrication-in-transit rate structure applicable to these structurals. These so-callen f.i.t. rates on structural products permit steel to move out-of-line from the steel plant to the fabricator's shop, and, as fabricated material, to final destination at the through rate from steel mill to final destination plus a slight charge for stop-over which varies among freight areas and railroads but is about 3c. per cwt. Incoming way-bills may be accumulated and used on outgoing shipments which permit the greatest saving to the fabricator. So long as foreign mills are willing to quote him, therefore, a purchase of steel from the foreign mill is preferable to a purchase from the immediate mill because the incoming way-bill on the former may have a value up to $5 or $6 per ton depending on destination and freight-rate structure while the latter has little or no value for f.i.t. purposes. Thus, if the home mill is to retain his business, it must cut the price to compensate the fabricator for foregoing his f.i.t. privilege.

Consistent with Figures

"This explanation is consistent with the small proportion of the total receipts of the home consuming district supplied by the local plants in shapes and plates (roughly 49 per cent for each) as contrasted with the high proportion in sheets and strip (82 and 78 per cent).

"6. Using shipments priced on the nearest basing point as a criterion of natural market, for strips, sheets and plates slightly more than 50 per cent of receipts in this market were supplied by the 'governing' producing area but over two-thirds of this market was thus supplied with shapes. The advantage in mill-net yield for producing areas on sales within this market averaged $1.57 per ton for strip and around $2 for the other three products although the advantage in average freight absorption was substantially higher than that in mill-nets for every product. This again indicates relatively greater price cutting in the home market by home mills than in outside markets.

"7. Using average freight absorp-

tion on shipments priced on the nearest basing point by each producing area as a criterion of its market, roughly 27 per cent of shape and plate shipments by producing areas were made into their markets so defined; 34 per cent of sheet and only 14 per cent of strip shipments. But it is interesting to observe that many of the most important producing areas are excluded from their home consuming areas on such a criterion. That is, freight absorption on shipments by such producing areas into their home consuming areas was above the average on all sales.

Gain Except for Sheets

"8. Using average mill-nets received on sales priced on the nearest basing point as a criterion, the percentage of total shipments by producing areas shipped into their markets is increased substantially for all products except sheets (i.e., for shapes it becomes 33 per cent, plates 49 per cent, sheets 36 per cent, and strip 34 per cent). Average advantage in mill-net to producing areas selling within rather than outside this market ranges from roughly $2.50 for strip to $3.66 for sheets.

"9. Using the lowest average freight paid or allowed from steel plant to destination as the criterion of the market, producing areas shipped 58 per cent of their total shipments of shapes into such markets, 67 per cent of their plates, 43 per cent of their sheets and 44 per cent of their strip. This measure of market area conforms most closely although very crudely to that defined in terms of the f.o.b. mill price if such mill prices are equal. It is interesting to note that if all shipments received by consuming districts in each such market, irrespective of source, were in fact supplied by the 'governing' producing area (i.e., that producing area closest freightwise), some of the most important producing areas could not have confined themselves to that market without drastically curtailing their total shipments. For example, such markets would have provided an outlet in shapes for only 23 per cent of shipments made by Buffalo; 41 per cent of those by Colorado; 62 per cent for Pittsburgh-North Ohio River plants; 94 per cent for Chicago.

"In plates similar percentages for Pittsburgh - Youngstown - North Ohio River plants was 61 per cent; for Birmingham, 63 per cent. In sheets, Pittsburgh - Youngstown - North Ohio River only 14 per cent; Middletown-Newport-Ashland, 77 per cent; Chicago, 79 per cent; Buffalo, 85 per cent. In strip, Pittsburgh - Youngstown-North Ohio River, 30 per cent; St. Louis, 68 per cent; Chicago, 82 per cent.

"In presenting these last percentages, I must emphasize that the ability or the inability of mills in a given producing area to market their output in areas most cheaply reached in terms of freight costs constitutes by itself an argument neither for nor against a basing-point system of pricing or any other pricing system."

Basing Point Critics Disregard Economic Facts, Witnesses Say

WASHINGTON—Benjamin F. Fairless, president, and Avery Adams, vice-president, United States Steel Corp., were called to the stand by Federal Trade Commission representatives as the steel corporation distributed copies of a statement which said that most criticisms of the basing point method disregard entirely the fundamental economic facts that the system is a simple method of quoting delivered prices and results in the competition of many geographically separated steel producers; that it is not a price-fixing medium resulting in high prices nor stifled competition, but rather a practice that has evolved over a period of more than half a century to meet fundamental economic conditions in the steel industry.

"The steel industry," the statement continued, "is often judged by criteria derived from abstract theory, based upon imaginary conditions which cannot exist. Natural deviations from these criteria are arbitrarily assumed to be evils and are without demonstration ascribed to the basing point method.

Matter of Name-Calling

"Critics sometimes rest their case solely upon bland assertions and rhetorical exaggeration. In many instances, mere name-calling is resorted to. Thus, in the language of some critics, the practice of meeting competitive prices at a distance becomes 'freight absorption'; the resulting difference in mill net returns becomes 'price discrimination'; the resulting shipments from other than the mill nearest the destination becomes 'cross-hauling'; and the realization of a competitive advantage due to superior geographical location becomes 'phantom freight'."

"Competitive forces determine the prices quoted at all destinations. To obtain business in a market at a distance from his mill, a producer must meet competitive prices quoted by other producers nearer to such markets; he must pay the freight necessary to transport the steel product to the consumers; and he will therefore realize a lower mill net return than on sales to consumers nearer his mill. This enables him to operate his mill at a lower unit cost and thus to sell to the nearby consumer for less than he otherwise could."

After questioning the two steel corporation spokesmen in detail on the corporation's basing point study submitted to the TNEC, FTC Attorney Wooden asked Mr. Adams if the policy of quoting delivered prices was one which had the approval of steel customers. Replying in the affirmative, Mr. Adams submitted for the record a copy of THE IRON AGE containing the results of an IRON AGE poll conducted last year which showed that 92.4 per cent of steel buyers who replied responded "Yes" to the question: "Do you feel that your ability to buy steel from a number of different sources at no difference in the delivered cost to you is an advantage in the economical operation of your business?"

Poll of Buyers Cited

Although Mr. Adams did not specifically call it to the committee's attention, the same article (see THE IRON AGE for April 20, 1939, page 46; and for May 11, 1939, page 109) indicated that 86.4 per cent of the steel buyers who replied answered "No" to the question: "Do you agree with the contention of the Federal Trade Commission that the abolition of freight rate equalization on steel shipments would be a good thing for the steel consuming industry?"

Denying the allegation made by the FTC attorney that the steel corporation has refused to quote a price at the mill, Mr. Adams replied that his organization had never received numerous requests for f.o.b. mill prices; that in some cases requests had been complied with despite the corporation's policy of quoting exclusively on a delivered-price basis. Under further questioning, Mr. Adams denied that the corporation refused to grant mill prices to the Federal Government, pointing out that the government

nevertheless stands with all other consumers in appraising prices on a delivered-price value because "it is interested in the price at the point where the steel is to be used."

Mr. Wooden sought to obtain from the witness the assertion that the steel corporation's published price plus the freight charge controls the delivered price in some territory, but Mr. Adams said he could not concur.

Under Published Price

"Our policy," he said, "is to be competitive, naturally. Our records will show that our average price, with the exception of the NRA code period, has been lower than our published price."

Through further inquiry, Mr. Wooden attempted to gain the admission that while it is the practice to deviate from base price, such deductions are made without a public announcement of a price change.

"If competition breaks out at a certain point we will deviate to meet it. If it becomes general we reduce our published prices," Mr. Adams said, adding that his organization thinks in terms of delivered prices when it reduces a price, the result of which, he said, is a reduction of the mill net return. The freight that interests the company is the actual transportation costs, not the costs of a competitor, when the steel corporation determines whether it wants to be competitive in a given area, he said.

Mr. Adams agreed with the FTC attorney that it frequently happens that when the steel corporation sells steel at a point where there is another basing point mill, the corporation has to absorb a substantial amount of freight and the mill net return becomes less than the mill price. The corporation realizes less mill net yield daily when it goes into such territory, Mr. Adams continued. He concurred with Mr. Wooden that the mill net yield is increased when other forms of transportation are used but qualified the statement by remarking that such shipments cover "a very limited amount of tonnage."

Little Shipped by Water

Mr. Adams referred to steel corporation figures at this point, calling the attention of the committee that out of 12,700,000 tons of steel shipped in 1937 there were only 18,000 tons shipped by water on which rail rates were charged. He characterized this as an infinitesimal amount.

Turning to Mr. Fairless, the FTC attorney asked if he concurred with Robert Gregg, now president of the Tennessee Coal, Iron & Railroad Co., when Mr. Gregg testified before the Senate Interstate Commerce Committee in April, 1936, on the Wheeler anti-basing point bill pending at that time.

Mr. Wooden read from a transcript of testimony taken by the Senate committee:

"The Chairman (Senator Burton K. Wheeler, Democrat of Montana and sponsor of the bill which he later dropped): You say you have no agreement, but there is a general understanding among all producers of steel throughout the United States at the present time that they do follow the basing point, plus freight?

"Mr. Gregg: That has been the general merchandising plan in the industry.

"The Chairman: So that if the plan is followed, there is no competition so far as price is concerned?

A One-Price Set-Up

"Mr. Gregg: On the contrary there is competition. To answer your question specifically, if that plan were universally followed there would be no competition insofar as one element of competition is concerned, namely, price; but—"

Mr. Fairless replied that obviously it would be "a one-price set-up" if every steel company followed the published price, used the nearest basing point, and added the extras involved plus the transportation charges to the point of delivery. But that is only the theory and not practically the result, he emphasized, with the exception of the period when the NRA steel code was effective. From a practical point of view, actually every company is out fighting for business on a competitive basis, Mr. Fairless added.

Mr. Wooden then sought substantiation for the observation that "when the basing point system is followed there is an absence of competition; and when it is not followed there is competition."

"We do not realize our announced prices," Mr. Fairless asserted. "When we quote our prices, those are the ones we want to get. We think they are fair. They're based on cost and a reasonable profit. When we find we cannot get those prices due to competition, we reduce them."

No Better Plan so Far

In further defense of the basing point system, Mr. Fairless told the committee that the United States Steel Corp. would welcome a better method of merchandising its steel but that so far none had been devised.

"Here is an industry with a 65,000,000-ton capacity of steel. How could this be merchandised without a plan," he told Mr. Wooden.

After Mr. Fairless recalled that the basing point system worked "beautifully" under the NRA steel code, but that that period was an exception, Mr. Ballinger, who took a conspicuous part when the FTC launched its attack on the system last March, asked the witness if he would indorse legislation to outlaw the basing point system.

"Why eliminate it?" Mr. Fairless asked. "It is the only method of merchandising steel. The multiple basing point system was not designed to prevent competition. On the contrary it is just a merchandising formula."

Asked by Mr. Wooden if it was the intention to "defend the system itself by showing there are departures from it," Mr. Adams interjected at this point, insisting that "under the perfect functioning of the system we do have competition and that even if we have identical delivered prices at point of consumption there is still competition."

Mr. Fairless likewise denounced the FTC allegation that there is a relationship between the system and price trends in the industry, insisting that any break in price is not indicative of a breakdown of the system. He told the committee that it worked just as well when the price broke $6 to $8 per ton on flat rolled products as it did before.

Vehicle for Merchandising

"We contend that the basing point system is only a vehicle for merchandising our product," he related. "It is used only because we know of no better method. If out of these hearings could come a better method, we would be the first to welcome it."

Earlier in the session, the statement distributed by the corporation had pointed out that the proposed alternative to the basing point method, a uniform f.o.b. mill price system, would, if adopted, displace the present widespread competition and low costs.

"The effects of this system would be extremely complex, and are therefore largely unforeseeable," the statement said, without mentioning that the f.o.b. mill system is what the FTC would like to see substituted. "Its exponents propose it in the name of abstract theory, and have outlined its characteristics and effects only with respect to the elimination of supposed evils of the basing point method. They have never described the operation of the system nor analyzed its effects in

relation to the economic facts of the steel industry.

"The uniform f.o.b. mill price system is expected by its exponents to eliminate high cost, inefficient and supposedly uneconomically located mills and to break up concentration of production facilities, by forcing the erection of small mills in all parts of the country. Such results, even if they would be accomplished by the system, would conflict with basic economic factors, and necessarily increase present production and transportation costs."

Switching Charges Adopted

Mr. Wooden, shifting his line of questioning to the industry's experience under the steel code, sought to learn from Mr. Fairless what part he had played as an officer of the steel code authority. Calling the committee's attention to the fact that steel prices upon the abolition of the NRA became highly competitive almost over night, Mr. Fairless said he recalled that under resolutions adopted by the industry during the NRA period switching charges of 50c. at Pittsburgh and 60c. at Chicago were adopted. He concurred with Mr. Wooden that these charges are still in effect, pointing out that the corporation had mentioned that fact in its report to the TNEC, but he emphasized that in most cases the actual switching charge is higher than what Mr. Wooden characterized as "the arbitrary switching charge."

Mr. Wooden also recalled for the record that under another NRA code resolution a buyer of steel who took delivery by truck was allowed a 65 per cent reduction from the all-rail freight rate which, the FTC attorney contended, was tantamount to paying a premium of 35 per cent.

Defending this practice, Mr. Adams said there had been no attempt made to conceal the fact that the policy was designed to discourage the use of trucks because "our production facilities are not adaptable to truck shipments." He testified that there is the space factor to consider in making truck shipments and that there was also the question of damage in transit, adding that the policy is to charge all-rail rates because an analysis showed that "there is practically no difference generally speaking." He estimated that out of 12,700,000 tons shipped in 1937,, there were only 313,000 tons on which the 65 per cent deduction had been made, and that the corporation received very few requests for delivery at the mill for truck shipments. On this subject, the corporation statement said:

"Transportation of steel products by water vehicles and trucks has received attention unwarranted by its true importance, and significant factors in the situation have been overlooked. The practical availability of each of these mediums of transportation is circumscribed by many inherent limitations. The producer located so as to be able to transport some products by water has an advantage over other producers not so located, which he is properly entitled to realize by a higher mill net return. His advantage often lies merely in the ability to reach markets from which rail freight rates would bar him.

"Where all the circumstances warrant it, the advantage is passed on to consumers by lower delivered prices. The producer's advantage, however, is one which may easily turn into a disadvantage. If he gives one consumer the benefit of the saving resulting from water transportation, he may soon have to make the same price to all consumers in the area and ship by rail, with freight disadvantages which will lower his mill net returns. Shipment by truck seldom involves an appreciable freight saving, and often involves additional freight cost. The added expense and inconvenience to the producer in truck shipments justify any additional charges made."

Patience Worn Thin

Resorting to quibbling tactics and repetition of heckling questions that clearly wore on the patience of committee members, the FTC representatives closely questioned Mr. Fairless and Mr. Adams about trade practices in the steel industry. The apparent purpose was to show that collusive practices exist and that they are made possible by the basing point system. Commissioner Davis joined Attorney Wooden in a long wrangle over so-called identical delivered prices. Much emphasis was given by them to the fact that Pittsburgh is the only basing point in the East for tin plate. They wanted to know if the Bethlehem Steel Co., adopted Steel corporation prices on that product. Mr. Fairless said that he did not know what the quotations or practices of competitors were and declined to comment on them.

Pressed further by Mr. Wooden with general questions, many of them seeking to learn whether trade practices adopted under the NRA steel code have been continued, Mr. Fairless appealed to the committee.

"I can't answer these questions that are obviously put to confuse the issue," said Mr. Fairless with some heat. "I can't answer them when I don't know what he is talking about."

Fairless Is Upheld

He added, however, that he would answer any specific question and gave an emphatic "no" to the query whether the Steel corporation has in official effect any of the steel code resolutions.

The refusal of Mr. Fairless to attempt a reply to other than specific questions was upheld by J. J. O'Connell, Treasury Department Committee representative, who was presiding at the time of the interchange.

In the course of discussion of tin plate prices, Mr. Fairless said that prices deviated. Commissioner Davis joined Mr. Wooden in a request that Mr. Fairless submit to the committee a record of deviations in tin plate prices of the Steel corporation and its competitors the past year. Mr. Fairless said that it would be impossible to prepare such a statement since he knew nothing of competitors' prices. Davis and Wooden then requested a statement showing deviation in Steel corporation prices and Mr. O'Connell volunteered the remark that it hardly would be fair to require the Steel corporation to make its quotations public when competitors are not also required to do so.

Both Busy Men

At another point when Mr. Wooden was inquiring about practices of Steel corporation competitors, Mr. Fairless faced the commission attorney and said:

"Mr. Wooden, you undoubtedly are a busy man and I know I am. To any of these questions my answer is that I don't know."

Questioned about the number of basing points, Mr. Adams said that the Steel corporation has 52. Mr. Fairless told Mr. Wooden that at present the Steel corporation has basing points for tin plate at Chicago and Pittsburgh and has not as yet established Birmingham as a basing point for that product because the corporation's Birmingham subsidiary, Tennessee Coal, Iron & Railroad Co., began producing tin plate only about a year ago and has very little tin plate business except that which is controlled by the American Can Co., and the Continental Can Co., which have contracts with the Carnegie-Illinois Steel Corp. The latter, it was stated, with the consent of the two can companies, has allocated a certain amount of its tin plate to the Tennessee Coal, Iron & Railroad Co. It was added that the Steel corporation has not as yet determined its policy with respect to making Birmingham a tin plate basing point.

When the hearing was resumed

Monday, Mr. Fairless obtained approval to introduce into the record THE IRON AGE article of April 20, 1939, showing overwhelming steel consumer opposition to a change in the steel basing point system.

Steel Code Emphasized

Mr. Wooden then continued to peck away at NRA steel code resolutions which he said had been continued in effect after the NRA was held unconstitutional. He requested Mr. Fairless to identify them. Mr. Fairless said he was not present when the resolutions were adopted but that he was willing to accept them. Hugh E. White, FTC representative, identified the resolutions as those which he had taken from institute files. Mr. Wooden's purpose, he explained, was to show that the steel industry continues standard practices set up under the code so as to arrive at identical delivered prices. These practices covered such subjects as the basing point system, arbitrary switching charges, the 65 per cent allowance on trucking, publication of a rate book, etc.

Mr. Fairless declared that steel code resolutions are not now in effect as such in the Steel corporation. He said that they had been adopted during the code period as representative of what was considered by the steel industry to be practices for the best of the public interest. As the code was built and functioned, he said, it developed weaknesses which were corrected. Asked by Garland S. Ferguson, FTC member, whether the practices still operate, Mr. Fairless replied that some of them were continued because they are fair and were accepted by buyers. Answering a query by Mr. Wooden regarding the trucking resolution, Mr. Fairless said he had no difference with the commission attorney respecting the resolution but pointed that under the code its terms were compulsory while it is not compulsory today. The practice under the resolution was said to have been determined upon after careful study.

Trucking Allowance Practice

"Naturally, to take that situation and apply it all over America, brought protests and many were justified but the majority had to be taken into consideration," said Mr. Fairless. "The code went out and this resolution went with it. The thing continues today where it is proper."

The Steel corporation president then repeated a previous statement saying that the trucking allowance practice is not applied universally by the Steel corporation. He cited the fact that oil country goods shipped from the National Tube Co. plants at Lorain, Ohio, and Pittsburgh to the Houston, Tex., warehouse are hauled from the latter in trucks for which only handling charges are made. Mr. Fairless said the same policy applies to many customers who truck wire and sheet products. He added, however, that the 65 per cent credit generally is applied, and is fair.

"We have no apologies for it," he continued. "Any time any group of customers or individual buyers feel an injustice has been done the group or individual can go to the Steel corporation companies and both will go away happy."

When Mr. Wooden pressed questions concerning identical delivered prices based on switching charges, Mr. Fairless said he was proud of such prices because they treated all customers alike in a given area. He recited figures to show that at different points the Steel corporation switching charges are less than the minima which had been established.

Mr. Wooden repeated questions concerning the continuance of the institute rate book. Mr. Fairless said it is his recollection that the book is still published but that he does not see it since it is a matter for the traffic department. He added that the latter does rely solely on the book but gathers rates on its own initiative in order to keep up to date.

Heating, Ventilating Exposition Shows Gain In Exhibitors Space

CLEVELAND — Growing importance of the air conditioning, heating, ventilating, refrigerating and associated fields was emphasized here last week during the five-day bi-annual Heating and Ventilating Exposition. Exhibitors space increased over 1938.

Most of the principal steel companies had exhibit space for promotion of sheets, piping materials and other products of interest to the field.

Included in the technical sessions of the American Society of Heating and Ventilating Engineers were a discussion on lint and dust in air ventilator performances and a discussion of aluminum insulation for buildings.

Dr. Harvey N. Davis, president, Stevens Institute of Technology, Hoboken, N. J., was the principal speaker at the annual banquet, his theme being the importance of industrial research.

The National Warm Air and Air Conditioning Association also was in session, discussing technical problems dealing with both the technique of methods in development and installation and merchandising of related products.

Uses for magnesia and aluminum attracted considerable interest at the exposition. A Detroit company displayed insulating material faced with aluminum foil which the automotive industry is reported adopting on a generous scale.

New applications for an insulation containing 85 per cent magnesia and 15 per cent long asbestos fibers attracted much attention at the show.

New finishes in register and grille manufacture included extensive applications in oxidized polished and bronze copper, electroplated and sand blast nickel, oxidized brushed and polished brass, cadmium plate and chrome plate, and various white and electro-plated bronzes.

One steel company, in addition to its galvanzied controlled spangled sheet, announced another new sheet product whose special value is its quality of paint retention.

Pontiac Pattern to Make Nickel-Chromium Cast Iron

PONTIAC PATTERN & ENGINEERING CO., 250 So. Sanford Street, Pontiac, Mich., has installed additional equipment and is introducing a line of nickel-chromium alloy cast iron, according to Albert Weber, president. Newly installed equipment will make it possible to produce approximately 80 tons of castings per month. A new oil fired crucible has been installed, together with blowers, flasks and molding machinery and special cleaning equipment.

Koppers Oven Contract

PITTSBURGH—Koppers Co., engineering and construction division, has been awarded a contract by Carnegie-Illinois Steel Co. for construction of 142 Koppers-Becker underjet coke ovens for use at the company's Gary, Ind., plant. The ovens are scheduled to be completed by the end of the year.

Leaf Spring Seat For Automobiles

ATTENTION has been focused on auto seat design as a method of improving riding qualities and, at the same time, decreasing weight and cost. At the January national meeting of the Society of Automotive Engineers, Clyde R. Paton, Packard chief engineer, was one of those who advocated that cushion design be accepted as a dynamic problem, rather than a static one. He speculated on the possibility that the leaf spring type of cushion might be put to use in automobiles, and added that "we may subsequently find advantage in a means for elastically suspending the seat assembly as a whole with respect to the car body."

Development of the leaf spring seat was first revealed in the "Assembly Line" in THE IRON AGE more than a year ago, on Jan. 26, 1939, but the accompanying pictures are the first published anywhere until Mr. Paton showed them as slides in connection with the SAE address. (An independent supplier, not a motor car company, is sponsor of the seat development.)

The photographs permit a comparison with a conventional seat design. The standard coil spring seat cushion and back consist of a metal base, a border wire, diagonal and longitudinal brace wires, and from 40 to 100 coils each, dependent on price class. The untrimmed seat weighs from 70 to 85 lb., including foot rest and tracks for adjustment. Padding and trim material add about 30 lb. The leaf spring seat eliminates the large stamping, making use of a tubular frame, leaf springs, transfer bars (not shown) and minor parts weighing approximately 60 lb. before trim and padding are added.

It is understood that important problems have been solved in connection with the problem of obtaining necessary steel for the leaf springs at competitive cost. The leafs are 1½ in. wide, and 0.030 in. thick. This type seat is understood to be a probable feature of 1941 models.

THE leaf spring seat which weighs, trimmed, approximately 90 lbs., a saving of 10 to 25 lbs. compared with conventional coil spring seats.

Obituary

DONALD LAMONT BROWN, president of the United Aircraft Corp., Hartford, Conn., died in Doctors' Hospital in New York on Jan. 29 after an extended illness. He was born in Berlin, Wis., 49 years ago and made his way through Northwestern University by working for the Illinois Steel Co. His first connection with the aircraft industry was in 1915 when he joined the Simplex Automobile Co., which at the time was making aircraft engines. Two years later when the company was reorganized to become the Wright-Martin Aircraft Corp., Mr. Brown was put in charge of the assembly department of the Long Island City, N. Y., plant. He left the following year to become assistant production manager for the Olds Motor Works. Three years later he became assistant factory manager of the Wright-Aeronautical Corp. In 1925 he helped organize the Pratt & Whitney Aircraft Co. and was made factory manager of the new plant. Four years later he had become a director and vice-president in charge of manufacturing. He was elected president in 1930, and four years later president of the United Aircraft Corp., of which the Pratt & Whitney company became a subsidiary.

$30,000,000 Expansion For Aluminum Co.

PITTSBURGH — Anticipated increases in markets for aluminum, according to Roy A. Hunt, president, Aluminum Co. of America, accounts for the launching of a $30,000,000 expansion program, supplementing the recently completed $26,000,000 building program started in 1937.

A substantial portion of the new construction work is planned for New Kensington, Pa., and includes the erection of a new metallurgical laboratory, additions to the melting and heat treating facilities of the strong alloy mill, a six-bay extension to a six-story warehouse and the addition of a wing to the Aluminum research laboratories. The latest announcement includes the construction of a new metal producing plant at Vancouver, Wash., which was mentioned in THE IRON AGE recently. Other items in the company's expansion program include a bauxite plant in Paranam, Surinam, Dutch Guinea, new ore carrying vessels for the Ocean Dominion Steamship Co. in South American transport, additions to the Mobile, Ala., Alcoa, Tenn., and the East St. Louis, Ill. works, and improvements in the hydro-electric stations along the Little Tennessee River.

Facilities of the structural and merchant mills at Massena, N. Y., are being increased, along with additions in rolling facilities at Edgewater, N. J., die casting operations in Garwood, N. J., forging equipment at Cleveland and Los Angeles, and extrusion facilities in Lafayette.

Scrap Firm Organized In New York City

THE Dreifus Iron & Steel Corp., 30 Broad Street, New York, has been formed to take over the business formerly conducted as a branch office of the Charles Dreifus Co., Philadelphia. Charles Dreifus, Jr., is president and treasurer, and Charles Hogan, assistant treasurer. The firm will deal largely in export of iron and steel scrap and will operate the Brooklyn loading dock previously owned by the Charles Dreifus Co.

Galvanizers Meeting

THE Galvanizers Committee, organized under sponsorship of the American Zinc Institute, Inc., will hold its annual spring session at the William Penn Hotel, Pittsburgh, April 11-12. Twenty steel companies will be represented.

Business, New Deal Fail to Solve Problems, Flanders Says

CINCINNATI—Business must rediscover its courage and government must remove the hurdles, Ralph E. Flanders, president of the Jones & Lamson Machine Co., told the Cincinnati Section, American Society of Mechanical Engineers, last Thursday at Cincinnati.

The Springfield, Vt., engineer, past president of both the Engineers' Society and the National Machine Tool Builders Association, said both business and the Administration had failed to create a new pattern of living in this country. The basic problem, he said, was unemployment, for the solution of which he offered this seven-point program:

1. Creation of a new Federal Employment Service armed with complete facts regarding both the extent and types of unemployment.

2. A program of useful works projects prepared in advance and ready for application without confusion or wild spending.

3. Maintenance of normal wages and working conditions on such projects, the norms to be determined by general economic conditions.

4. Prevention of any competition between these works projects and private business.

5. Administration of these projects by a board removed from politics and the pressure of Congressional logrolling.

6. The acceptance of such projects by business as normal and remedial, instead of as unwarranted interference.

7. The philosophy behind this program must be based, not on abstract theories of government or taxation, but on a sincere desire to stimulate business.

Mr. Flanders said also that business must accept the thesis that government is to provide basic subsistence for all. This, he explained, did not mean that government is to provide a dole, but jobs to all able and willing to work.

He asserted that government also should contribute goods and services needed in both childhood and old age, but, in turn must inculcate the doctrine that in the middle, productive period of life the citizen must support the government.

If the shackles now binding business enterprise are not removed, we can never produce enough to pay for these services which we have come to recognize as essential, he asserted.

He said that when these obstacles, both psychological and practical, were removed, production would increase, private incomes would mount, savings to be reinvested in industry would accumulate, and taxes for government services would become available.

All this, however, would be to no avail, he said, unless business dropped its reluctance to take risks and expand.

Drop in Companies a Cause of Idleness, Economists Report

A DECLINE in the number of going concerns since 1929 is one cause of unemployment in the U. S. since that year, A. W. Rucker and N. W. Pickering, business economists, conclude in a study just published by Farrel-Birmingham Co., Inc., Ansonia, Conn.

They quote figures from the U. S. census of manufacturs to show four shifts in job opportunity—(1) from the durable and heavy goods industries to the consumable and light goods industries, (2) from the New England and Atlantic seaboard states to the Mid-West, South and Pacific Coast, (3) from the largest and smallest-sized concerns to medium-sized concerns, and (4) a shift from the largest and smallest of the great industrial areas to either the medium-sized cities or to the smaller cities and towns outside the principal industrial areas.

"The conclusion that the so-called 'reforms' of the New Deal discouraged enterprise and to a large degree caused much of the prevailing unemployment appears well warranted," the economists declare. "In a broad sense much of the basic cause of the unemployment problem can be removed by cessation of efforts to protect an arbitrary wage rate structure and to conceal the effects thereof by enforced spreading of employment through the Federal Wage-Hour Law and the Walsh-Healey and Wagner Labor Acts. If the wage rates are allowed to find their economic level, many of the evils now visible will automatically correct themselves.

Bidding Cost Navy $5,000,000 On Four Ships, Edison Says

WASHINGTON — Secretary of Navy Edison told a press conference last week that his department had lost $5,000,000 in the construction of four recent battleships because competitive bidding required the drafting of two sets of plans. He said that it was his recommendation that Congress alter the present requirement that Navy contracts be awarded to the lowest bidder.

A clause in the Naval expansion bill now pending in Congress, representing another proposal to modify the bidding system, would permit repeat orders without competition to the builder of a successful ship. The Secretary said it was his opinion that the present statute restricting contractors to a maximum of 10 per cent profit affords ample protection for the government against high prices.

Moltrup Steel Defies NLRB Board Order

PITTSBURGH—The Moltrup Steel Products Co., Beaver Falls, Pa., has refused to comply with a recent National Labor Relations Board order requiring it to disestablish an independent union, to deal with the SWOC upon request, and to reinstate five discharged workmen with more than three years back pay.

The company, according to its counsel, "takes a position that it has not engaged in any unfair practices in violation of the Wagner Act and that the decree and order are erroneous, contrary to law, and of no legal force or effect."

"In consequence," the formal notice to the NLRB stated, "we believe the company is under no legal obligation to comply with any provisions of the order and we will not take any steps to do so."

The usual procedure, it is said, would now be for the NLRB to ask the Third United States circuit court of appeals at Philadelphia for enforcement of the order.

The NLRB order, with which the company refuses to comply, was handed down Jan. 15 following lengthy hearings and deliberations involving a strike and disorder occurring in the summer of 1937.

Iron and Steel Imports (In Gross Tons)

	November		Eleven Months Ended November	
	1939	1938	1939	1938
Pig iron	2,774	1,493	37,274	31,851
Sponge iron	172	56	1,703	436
Ferromanganese[1]	2,465	2,571	32,130	16,792
Spiegeleisen	3,233	5,056	32,795	14,827
Ferrochrome[2]	....	....	129	100
Ferrosilicon[3]	96	69	1,494	679
Other ferroalloys[4]	3	17	281	18
Scrap	837	4,749	28,225	17,932
Pig iron, ferroalloys and scrap	*9,580*	*14,011*	*134,031*	*82,635*
Steel ingots, blooms, etc.	....	7	12	204
Billets, whether solid or hollow	154	23	588	514
Wire rods	917	803	9,634	4,800
Semi-finished steel	*1,071*	*833*	*10,234*	*5,518*
Concrete reinforcement bars	15	114	2,365	1,215
Hollow steel bars	71	133	1,256	816
Merchant steel bars	582	1,730	16,557	17,044
Iron slabs	....	....	.....	.....
Iron bars	92	33	752	485
Boiler and other plate (including skelp)	3	53	27	356
Sheets, skelp, and saw plate	18	182	1,404	6,011
Die blocks or blanks, etc.	6	22	88	93
Tin plate, taggers' tin and terne plate	15	10	80	101
Structural shapes	530	3,798	38,398	35,768
Sashes and frames	....	....	5	.....
Sheet piling	....	....	462	235
Rails and track material	1,480	299	7,769	3,340
Welded pipe	....	440	4,462	5,364
Other pipe	320	1,709	25,741	21,494
Cotton ties	....	....	7,126	8,692
Other hoops and bands	363	1,658	16,280	15,296
Barbed wire	174	559	14,924	11,789
Round iron and steel wire	166	252	2,241	1,420
Telegraph and telephone wire	....	7	7	16
Flat wire and steel strips	226	302	2,818	2,400
Wire rope and strand	121	157	1,558	1,906
Other wire	45	208	1,473	1,386
Nails, tacks, and staples	162	842	7,139	6,923
Bolts, nuts, and rivets	9	21	105	207
Horse and mule shoes	....	25	324	404
Rolled and finished steel	*4,398*	*12,554*	*153,361*	*142,761*
Malleable iron pipe fittings	....	....	144	76
Cast iron pipe and fittings	104	148	1,582	1,373
Castings and forgings	63	81	1,100	3,420
Total	15,216	27,627	300,452	235,783

[1] Manganese content; [2] chrome content; [3] silicon content; [4] alloy content.

Iron and Steel Exports (In Gross Tons)

	November		Eleven Months Ended November	
	1939	1938	1939	1938
Pig iron	36,618	38,383	158,112	412,229
Ferromanganese and spiegeleisen	1,065	8	1,857	244
Other ferroalloys	555	43	3,194	1,040
Scrap, iron and steel	271,293	271,385	3,347,291	2,653,114
Scrap, tin plate	675	1,452	15,175	15,379
Waste-waste tin plate	688	566	8,559	6,703
Pig iron, ferroalloys and scrap	*310,894*	*311,837*	*3,534,188*	*3,088,709*
Ingots, blooms, billets, sheet bars	28,464	3,101	119,176	149,733
Ingots, etc., alloy steel, incl. stainless	16,809	323	36,575	7,538
Skelp	25,359	24,706	69,876	52,247
Wire rods	4,236	1,600	24,630	21,976
Semi-finished steel	*74,868*	*29,730*	*250,257*	*231,494*
Bars, plain and reinforcing	20,429	11,000	154,476	130,184
Bars, alloy steel	2,015	1,593	11,800	5,561
Bars, stainless steel	5	5	246	551
Iron bars	202	42	746	1,278
Plates, plain and fabricated	21,469	21,141	228,332	199,796
Plates, alloy steel	94	784	2,043	3,037
Plates, stainless	15	8	122	260
Sheets, galvanized steel	10,203	5,872	92,613	65,064
Sheets, galvanized iron	881	395	5,684	3,462
Sheets, black, plain steel	19,585	22,022	237,688	177,197
Sheets, alloy steel	229	34	3,324	3,214
Sheets, stainless	202	60	970	1,230
Sheets, black iron	1,409	406	8,087	6,695
Hoops, bands, strips, plain steel	9,771	5,752	74,695	54,835
Hoops, bands, strip steel alloy	22	40	458	350
Hoops, bands, strip steel, stainless	72	85	931	554
Tin plate and taggers' tin	46,587	10,908	247,850	146,492
Terne plate (incl. long ternes)	454	341	5,045	4,088
Structural shapes, plain material	12,999	6,916	103,127	77,853
Structural material, fabricated	3,165	3,398	30,109	36,133
Sheet piling	89	526	7,085	3,390
Tanks, steel	2,619	1,746	23,737	35,503
Steel rails	4,274	4,349	52,651	77,722
Rail fastenings, switches, spikes, etc.	1,603	1,029	14,908	12,038
Boiler tubes	2,835	432	10,896	7,836
Casing and oil line pipe	15,248	4,368	80,204	66,143
Pipe, black and galvanized, welded steel	7,290	2,361	39,813	22,227
Pipe, black and galvanized, welded iron	1,061	444	6,643	4,960
Plain and galvanized wire	6,974	5,881	50,980	45,265
Barbed wire and woven wire products	7,107	4,064	51,051	34,052
Wire rope and other products	1,770	1,129	13,188	9,492
Nails and tacks	5,206	2,663	26,996	23,052
Bolts, nuts, rivets and washers except track	963	665	7,729	7,308
Other finished steel	1,386	182	8,287	2,875
Rolled and finished steel	*208,233*	*120,641*	*1,602,514*	*1,269,697*
Cast iron pipe and fittings	5,873	3,758	38,559	29,770
Malleable iron screwed fittings	452	183	3,975	2,789
Car wheels and axles	2,516	1,872	25,694	20,360
Castings, iron and steel	571	669	5,187	5,947
Castings, alloy steel, incl. stainless	67	225	1,330	908
Forgings, plain	1,908	630	12,562	7,566
Forgings, alloy steel, incl. stainless	173	43	1,726	801
Castings and forgings	*11,560*	*7,380*	*89,033*	*68,141*
Total	605,555	469,588	5,475,992	4,658,041

November Steel Exports 332,899 Tons

EXPORTS of iron and steel products, excluding scrap, from the United States during November totaled 332,899 gross tons, valued at $22,791,622, compared with 255,081 tons valued at $16,835,795 in October, according to preliminary figures of the Bureau of Foreign and Domestic Commerce. November exports last year totaled 196,185 tons valued at $11,527,134. Eleven months' exports in 1939 totaled 2,104,967 tons against 1,982,835 tons in the like period of 1938.

Scrap exports in November totaled 272,656 gross tons valued at $5,173,374, compared with 336,775 tons at $5,739,606 in October.

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	November		Eleven Months End. November	
	1939	1938	1939	1938
United Kingdom	....	....	....	42
British India	1,290	149	23,655	12,114
Germany	....	....	....	....
Netherlands	....	1,158	6,473	14,086
Canada	1,272	36	6,729	1,866
France	....	....	....	....
Belgium	....	....	....	....
Norway	....	....	....	3,538
Sweden	161	150	261	205
Russia	....	....	....	....
Other countries	51	....	156	....
Total	2,774	1,493	37,274	31,851

November Imports of Iron and Manganese Ores

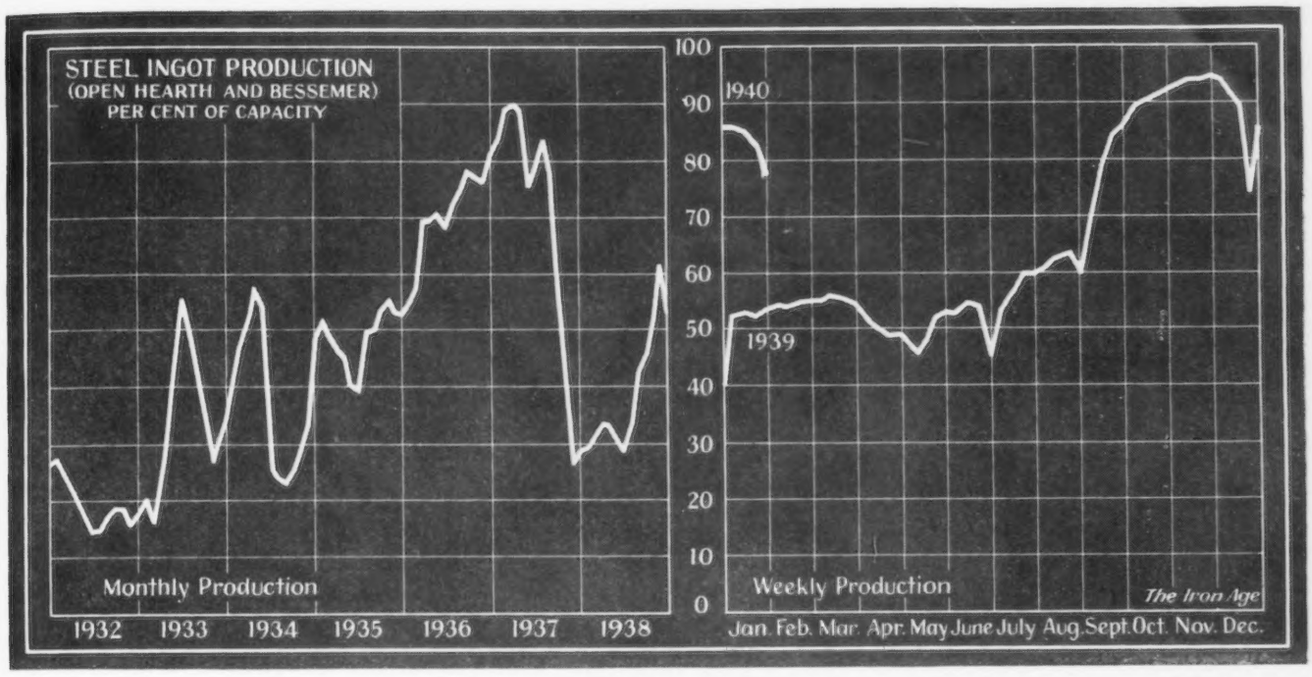
(In Gross Tons)

	Iron Ore		Manganese Concentrates, 35 Per Cent or Over	
	1939	1938	1939	1938
Canada	8,885	....	54	....
Cuba	21,500	21,000	6,109	4,137
Chile	176,400	129,800	....	....
Spain	....	....	....	....
Norway	....	7,089	....	....
Sweden	74,930	13,983	....	....
French Africa	....	....	....	....
Russia	....	....	4,790	4,716
India	....	....	2,277	923
Brazil	9,800	6,850	2,175	3,871
Gold Coast	5,020	....	11,401	9,831
Other countries	7,089	19,038	....	....
Total	303,624	197,760	26,816	23,478

Illinois Seeks Upset of Southern Freight Ruling

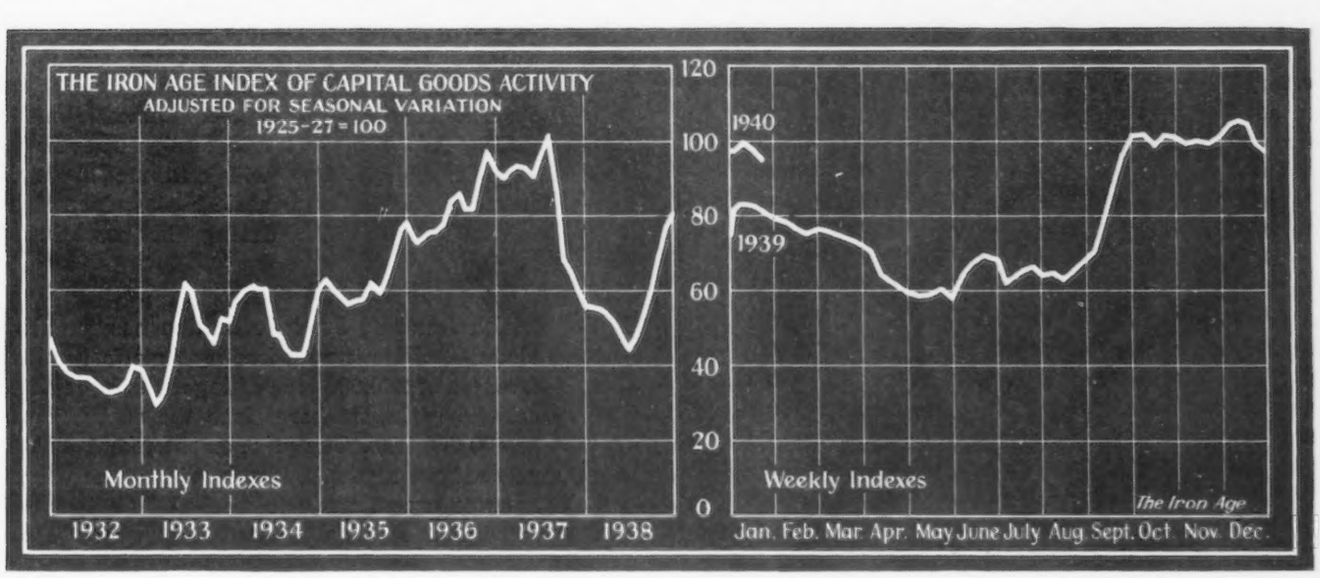
CHICAGO — The Illinois Manufacturers' Association will petition the Interstate Commerce Commission for a reconsideration of the Southern freight rate case, in which the commission decided that the rates on certain manufactured and processed goods from the South should be on substantially the same rate level as those manufactured and processed in Illinois and other Northern states.

Ingot Rate Drops Five Points to 77% of Capacity



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	73.0	85.5	62.0	82.0	75.0	61.5	80.0	98.0	94.0	75.5	85.0	68.5	90.0	**77.0**
PREVIOUS WEEK..	77.0	90.5	71.0	86.0	74.0	71.5	89.0	94.0	94.0	75.5	85.0	84.5	90.0	**82.0**

Index Off 3.1 Points in Counterseasonal Movement



DECLINES in the physical volume of output of practically all the heavy industries represented in THE IRON AGE index of capital goods activity pushed the combined index number down 3.1 points in the past week to 94.7 of the 1925-27 base, the lowest position touched by the index since the second half of September, 1939. While the actual losses in physical output for the week were comparatively small, adjustment against the rising seasonal trends brought sharp drops in the final indexes of the steel, automobile and Pittsburgh series. The decrease in the week's construction contracts awarded was proportionately heavier in the publicly financed classification than in the private group. The only factor to show a gain in physical output was lumber carloadings, but this gain was less than seasonal and resulted in a nominal decline in the adjusted index.

	Week Ended Jan. 27	Week Ended Jan. 20	Comparable Week 1939	Comparable Week 1929
Steel ingot production[1]	112.7	118.8	80.5	118.0
Automobile production[2]	113.9	118.0	95.4	143.9
Construction contracts[3]	68.2	71.1	104.7	119.8
Forest products carloadings[4]	64.6	64.8	57.5	133.2
Production and shipments, Pittsburgh District[5]	113.9	116.3	69.5	119.2
Combined index	**94.7**	**97.8**	**81.5**	**126.8**

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ending Jan. 20. Other indexes cover the week of Jan. 27.

. . . SUMMARY OF THE WEEK . . .

. . . Steel operations decline to 77 per cent as backlogs shrink.

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. . . Test of sheet and strip prices expected soon in Detroit.

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. . . Scrap quotations continue to decline; composite lower at $17.33.

EXCEPT for the probability that automobile companies will come into the market during February for their March steel requirements, there is nowhere convincing evidence of a broadening of steel demand in the immediate future.

While January is normally a period of slow pick-up, the situation has been affected this year by the heavy production of the fourth quarter and widespread cold weather and snow, which have delayed the placing of orders for spring activity.

Considering these retarding factors, some steel companies derive a degree of satisfaction from a steady flow of orders, even though the aggregate volume is not increasing and averages not more than 50 per cent of shipments. A further reduction of backlog tonnage accounts for a five-point drop in the ingot production rate for the industry to 77 per cent this week. In nearly all major producing districts there have been declines, which are only partly offset by moderate increases in the Cleveland-Lorain and Detroit areas. The highest operating rate in the country is at Detroit, which has advanced to 98 per cent, while the Birmingham rate remains steady at 94 per cent and the Chicago district, though below last week's rate, is as 85½ per cent. The Pittsburgh district is down to 73 per cent, Youngstown is at 62 per cent.

Accompanying the lower ingot rate is a reduction in pig iron output. Merchant pig iron business is slowing down along with steel. In one important district January shipments were 30 per cent below those of December.

A TEST of sheet and strip prices, which thus far have remained firm, may come this week or next with the purchase of 40,000 to 50,000 tons by an automobile company. Automobile companies have objected to the $2 a ton extra for coils recently adopted by the steel companies. The $2 a ton concession on hot rolled sheets recently given by some of the hand mills to meet competition of mill run cold rolled sheets has had no repercussions as yet.

The wide publicity given to the sale of about 120,000 tons of iron ore by the Oliver Iron Mining Co., U. S. Steel subsidiary, to the Ford Motor Co. at undisclosed prices, said to be below the market, has had a disturbing effect in various directions. Independent sellers of iron ore have ignored the transaction so far as their quoted prices are concerned, as appears from a small sale of old range non-Bessemer ore at the price announced for this season, but other steel companies are troubled as to whether they will be showing higher costs than the market calls for.

Meanwhile U. S. Steel will remain in the market as a seller of ore and is expected also to be more active in the sale of other raw materials it produces, including coal, coke, limestone and ferro-manganese.

A more sharply competitive situation in fabricated structural steel and reinforcing bars, brought about by the mid-winter dearth of new construction projects, is accompanied by price concessions in some districts, the situation on the Pacific Coast being particularly weak.

The trend of scrap prices reflects the somewhat uncertain outlook. Quotations are lower in nearly all districts, resulting in a further decline in THE IRON AGE scrap composite price to $17.33. Domestic mills are restricting their purchases and foreign sales have been negligible. The British will continue to take American scrap on a sliding scale basis which has been in effect on shipments during the past three months.

THE British Iron and Steel Federation has recently concluded negotiations with leading American mills for the purchase of 200,000 tons of ingots, bringing its total purchases of ingots here since the outbreak of the war to 400,000 tons. The price on the recent transaction has not been reported, but is said to have been low. Otherwise export trade is marked by a greater number of inquiries than orders, but the trend of buying has been slightly upward since the beginning of the year.

Railroad buying is not large, but the mills are being given releases against blanket commitments for rails and track accessories placed last fall. Major equipment programs are being held in abeyance pending a clearer outlook as to traffic trends. One important carrier, for example, contemplates the purchase of 25 locomotives and 2000 cars, but formal approval has been withheld by the board of directors. The Chilean State Railways has purchased 21 locomotives from American builders.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Jan. 30, 1940	Jan. 23, 1940	Jan. 2, 1940	Jan. 31, 1939
Rails, heavy, at mill	$40.00	$40.00	$40.00	$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.10	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	†3.40	3.40	3.40	3.20
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	$5.00

†Applies to 80-rod spools only.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	*$18.25*	$18.50	$18.25	$15.625
Heavy melting steel, Phila	*17.50*	17.75	18.50	15.25
Heavy melting steel, Ch'go	*16.25*	16.375	16.25	13.75
Carwheels, Chicago	16.75	16.75	15.75	12.50
Carwheels, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Pittsburgh	18.75	18.75	19.25	15.50
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	14.25	14.25	14.25	12.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$4.50	$3.75
Foundry coke, prompt	5.50	5.50	5.50	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Copper, Electrolytic, Conn.	*11.625*	12.00	12.50	11.25
Copper, Lake, New York	12.00	12.00	12.50	11.375
Tin (Straits), New York	**45.875**	45.00	48.75	46.45
Zinc, East St. Louis	5.50	5.50	5.75	4.50
Zinc, New York	5.89	5.89	6.14	4.89
Lead, St. Louis	*5.10*	5.35	5.35	4.70
Lead, New York	*5.25*	5.50	5.50	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Jan. 30, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$17.33 a Gross Ton
One week ago	2.261	22.61	17.54
One month ago	2.261	22.61	17.67
One year ago	2.286	20.61	14.875
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel: High	Finished Steel: Low	Pig Iron: High	Pig Iron: Low	Steel Scrap: High	Steel Scrap: Low
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	$22.50, Oct. 3	$14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.131c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 9

. . . THIS WEEK'S MARKET NEWS . .

STEEL OPERATIONS

. . . Industry rate drops five points to 77% . . . Some districts up

STEEL operations are lower in the larger producing districts, including Pittsburgh, Chicago, Youngstown, eastern Pennsylvania, Buffalo and Wheeling-Weirton, but are slightly higher in the Cleveland-Lorain district and at Detroit, while the Birmingham district maintains the same rate that has prevailed there for some time. The net result is a decline of five points in the industry average to 77 per cent.

NEW BUSINESS

. . . Backlogs further reduced as fresh buying lags

INCOMING business at PITTSBURGH in the past few days would hardly support 45 per cent of ingot capacity. Demand for practically all products is relatively light excepting that for oil country tubular goods. Most producers still look for a better volume of business by March 1 but admit that many consumers appear to be living off inventories for the time being, with the result that replacement orders are quite small. In other words, with actual consumption of steel being at a higher level than the volume of fresh steel orders, the latter is expected to slowly advance later on in the quarter as inventories are reduced to a point beyond which customers would not like to go in view of the foreign situation and other factors.

At CHICAGO mill operations are beginning to reflect more noticeably the unimproved state of new buying. Incoming orders generally are running below 50 per cent of outgoing shipments. One mill reports orders about 60 per cent of shipments, as compared with 75 per cent a week ago. While mill schedules may dip somewhat lower in the near future, producers show little or no anxiety, as backlogs still are heavy and better buying is expected in February, especially the latter part of the month. While inventory positions or consumers have been indicated to be rather comfortable, stocks still are not considered excessive, and many have given definite indications of renewed purchasing in the near future.

The Chicago outlook continues to be bolstered by a good maintenance of automotive and farm machinery production. Building construction also shows signs of an early uptrend, while some producers are looking forward to the beginning of secondary rail buying in February.

January closed at CLEVELAND and YOUNGSTOWN with aggregate new business still light, order backlogs reduced and producers carrying out an orderly downward adjustment of production facilities and operating personnel and raw material inventories. Despite disappearance of the abnormal aspects which featured the fourth quarter, present operations still remain in the level of good profits.

Predictions for February are tempered by the feeling that any sudden event might change the entire business picture in a brief time.

Alloy and stainless steel departments and tubular goods divisions are among the more active at CLEVELAND and YOUNGSTOWN.

Spring buying has been delayed by the severe cold weather and snow over the nation.

The volume of incoming business in EASTERN PENNSYLVANIA continues at a rate of between 40 and 50 per cent of shipments. While January bookings thus far are slightly below the December level, they are definitely above January, a year ago. Present orders in that area are extremely diversified as to source, but usually involved only very small tonnages. All industries in the EASTERN PENNSYLVANIA area are actively engaged and if the present rate of activity is maintained until the end of February, it is felt that inventories will be reduced to the point where new buying will be imperative.

New projects on the PACIFIC COAST showed a very material decline during the week. Although substantial construction steel tonnage is outstanding, the slate will be nearly blank when this is placed.

PRICES

. . . Mill quotations firm with test probably to come at Detroit

STEEL mill prices are generally firm, with the exception of the previously reported concession at DETROIT of $2 a ton on hot rolled sheets by hand mill operators. Some weakness is reported in various parts of the country on fabricated structural steel and on reinforcing bars from distributers' warehouses. The weaker price situation on fabricated material and reinforcing bars is particularly acute on the Pacific Coast.

A real test of mill prices may come with the reentry of automobile manufacturers into the market. Objection has been raised to the $2 extra for coils recently announced by sheet producers.

Cutting extras which were announced recently on hot rolled bars are substantially the same as existed before except that the language covering the extras has been clarified.

Revisions in the extra and deduction list of stainless steel announced recently are minor in character and resulted from analysis of production costs.

PIG IRON

. . . Orders continue light, shipments in most districts taper

NEW business is light at most points and shipments are declining, the January total running well under that of December. Except for considerable inquiry from abroad, the market is featureless. Volume of orders is declining at CLEVELAND, principal support there coming from automotive, railroad equipment and machine tool industries, with foundry coke deliveries for last month gaining over those in December. PHILADELPHIA shipments against domestic contracts are well maintained and little export business is being closed.

NEW YORK pig iron sellers report a tapering off in shipments. A few small export orders, one of bessemer analysis, have been placed recently. Shipments in the PITTSBURGH area have changed little the past week, Carnegie-Illinois Steel Corp. has banked a Duquesne stack, with other furnaces in that area to go out in February.

January shipments at CHICAGO are estimated at 30 per cent under December, while CHICAGO foundry operations continue little changed, the decline being attributed to steel plants and lack of substantial railroad business. Inventories of iron in this area are sizable.

In the BIRMINGHAM district Sloss-Sheffield No. 4 is down for relining, while in ST. LOUIS heavy scrap pur-

chases combined with a letdown of activities in lines other than agricultural implements have reduced shipments. Some contracts are being rewritten in SOUTHERN OHIO but weekly averages are not heavy. Machine tool and automotive casting makers are at capacity. At BOSTON there is no indication of second quarter buying, although foundry yard stocks are dwindling. Current buying is in car lots of special content for mixture purchases.

IRON ORE

. . . U. S. Steel sale to Ford has disturbed independents

GREAT interest in the Oliver Mining Co.'s recent sale of 120,000 tons of low alumina ore to Ford Motor Co. at an unannounced price, the first open market sale of any importance in the history of the mining subsidiary of U. S. Steel Corp. has been shown by raw materials departments and operating executives of independent steel companies, who are wondering whether they will now be showing costs higher than the market calls for.

The question assumes added importance due to the fact the Oliver company did not withdraw from the market after the Ford sale, but is willing to sell Mesaba ores in the open market at prices "mutually satisfactory" between buyer and seller, on long or short term contracts.

Up to the start of this week the sale had not been recognized by other mining companies. No announcement of the price paid by Ford has been made by the Oliver company or by U. S. Steel Corp. On Jan. 24 a CLEVELAND company sold a small tonnage of old range non-bessemer ore at $5.10 per ton, the quotation announced previously as the established price for 1940 delivery.

In general, average mining costs between different companies are believed to be about the same, but royalties vary. Some of the Oliver company's royalties are very low, being around 25c., contrasted with other recent royalties held by other companies which run up to $1.10 and in one instance to $1.25. Open pit mining costs are of course much cheaper than underground mines.

The Oliver sale to Ford, which became known about the same time as the Oliver inserted an ad in a mining paper revealing its position, was ascribed as a desire to ease the taxation burden.

Whether this tax problem arises in federal taxes, inter-company accounting, or state taxes is unknown.

The principal Minnesota taxes are an "ad valorem" or real estate tax on ore in the ground, classified as to reserves and operating properties, on a rate per ton basis, set by the tax commissioners—a personal property tax or stock pile tax as of May 1—a royalty tax assessed on mining companies on the amount of the royalty paid each year—and an occupational tax of around 9 per cent of the value of the ore produced in the year at the mine. In computing the latter, the market value is taken with such statutory deductions as costs, freights, etc., and the difference assessed at around 9 per cent.

The Oliver Co. has a number of leases expiring from 1942 to 1951 on such properties as the Leonidas, Missabi Mountain, Minnewas and Brindle properties, but generally such properties are cleaned out without undue difficulty by shifting shipping schedules.

Ford Motor Co. is expected to be in the market again for ore during the coming season. In a good year Ford uses better than 500,000 tons of ore, some usually coming from mines which the auto producer formerly owned. Ford moves the ore from upper lake ports in his own vessels.

. . . PLATES . . .

. . . Buying is light and deliveries are fairly prompt

New buying of plates at Chicago is substantially unchanged, with leading interests reporting order volume unvarying from the preceding week. In view of current light demand, backlogs are lessening and deliveries are becoming more prompt. Indications of a quickening of construction activity, however, brighten the prospect for increased demand in the near future.

CLEVELAND sellers report definite export inquiries for purchases are lacking, despite rumors that heavy business is being negotiated. On the domestic side one of the largest local inquiries involves plate for a large Detroit pipe line.

A moderate amount of miscellaneous orders, equal to about 45 per cent of productive capacity, continues to be booked by plate mills in EASTERN PENNSYLVANIA. Railroads continue to take small tonnages weekly on old orders, but shipyard specifications are slow to materialize. Most mills in that area have depleted backlogs and are able to arrange shipments in a few days if necessary. Very little universal capacity is operating at present. Export demand has moderated considerably from the spurt of two weeks ago.

Plate business in the NEW YORK district is spotty, ranging from practically no business to about 60 per cent of a normal week's volume. Tank builders are still seasonally inactive, and structural shops and the lighter building industry are dull. Shipyard buying has been light, except for yards operated by steel company subsidiaries. There has been some railroad buying, however, and oil companies have been purchasing plates for both domestic and foreign refineries.

SEMI-FINISHED STEEL

. . . British order 200,000 tons of ingots from American mills

NEW business at PITTSBURGH is substantially unchanged in volume from a week ago. Shipments continue somewhat ahead of incoming specifications and as a result backlogs are off substantially from their high point last November.

The British Iron and Steel Federation has recently placed orders with leading American mills for a total of about 200,000 tons of ingots. The price was not disclosed, but it is understood to have been low. This transaction makes a total of 400,000 tons of ingots that the British have bought in the United States since the outbreak of the war.

REINFORCING BARS

. . . Awards only 5500 tons . . . New projects 3200 tons

REINFORCING steel awards of 5530 tons include no letting of more than 900 tons.

New reinforcing steel projects call for only 3200 tons, with the largest inquiry of 1000 tons for Fred Sanders plant at Detroit.

Virginia Steel Co. is furnishing 560 tons of bars for a highway tunnel at Williamsburg, Va. Bethlehem Steel Co. is supplying 500 tons of bars for the Massachusetts Avenue bridge in Washington. Inland Steel Co., through Joseph T. Ryerson & Son, Inc., will supply 900 tons of bars for a Central Avenue viaduct, Chicago.

Market dullness at CHICAGO is at-

tributed to weather conditions, although activity is cited as quite satisfactory for this time of year. Largest pending tonnage involves 7500 tons for the west substructure, city filtration plant, and award is expected within the week. Michael Pontarelli & Son, Chicago, is contractor.

Ohio producers report an increased tendency toward price concessions on the part of reinforcing bar fabricators.

SHEETS AND STRIP

. . . Ford Motor Co. to buy 40,000 to 50,000 tons this week

THE Ford Motor Car Co., it is reported at DETROIT, will place orders this week for about 40,000 to 50,000 tons of sheets and strip for parts to be used in the manufacture of 100,000 cars. Negotiations as to price are said to center on the $2 a ton extra for coils recently adopted by the mills. As Ford is estimated to produce about 50 per cent of the steel required in its automobile manufacture, it is believed in steel circles that only a part of the tonnage mentioned will go to outside mills.

Pricewise it appears that present conditions are building up to a "war of nerves," especially in the automobile center. So far, however, there is no evidence of price weakness in sheets other than the $2 a ton concession given by some hand mills on hot rolled sheets, a concession that has virtually been forced on hand mill producers of hot rolled sheets in order to compete with mill run cold rolled sheets.

NEW sheet and strip business at PITTSBURGH has dwindled so rapidly in the past month that comparisons with December bookings are virtually meaningless. About the only type of buying in the market now consists of odds and ends involving small tonnages with actual orders few and far between. No major support to the sheet and strip market from a tonnage standpoint is in prospect until automobile companies make new buys. As usual, reports of early buying by automobile makers have had to be revised again with some steel producers looking for increased specifications by the middle of February.

At CLEVELAND up to Jan. 29 sheet and strip prices were being maintained satisfactorily by high speed mills, although lacking test by large tonnages. Although January flat rolled orders were the poorest of any month since mid-1939, early February is expected to bring orders from the automotive industry. In line with their policy announced several months ago, hand mills are selling black sheets, gages 19 to 22 inclusive, at 2.00c, which hardly classifies as news, except that it helps explain some of the confusion and rumors about prices recently. Manufacturers of snow shovels and sled runners have been buying more heavily than usual.

Orders for flat rolled steel at CHICAGO are unimproved in volume, and at some sales offices have registered a slight decline again. Shipments continue high, sheet and strip production being most prominent at the majority of local mills. General uptrend in new buying is not expected to be noticeable for another two weeks, but the near future outlook is seen encouraging, especially in view of anticipated renewal of heavy automotive purchases.

With unusual weather conditions continuing to hamper the steel market generally, the demand for finished sheets in the SOUTHERN OHIO area remains at about 55 to 60 per cent of mill capacity. Stove and refrigerator makers continue to purchase at apparent normal capacity, but jobbing and automotive demand is noticeably off.

Except for the placement of the March and April requirements of one of the largest consumers in the district, sheet sales in the NEW YORK area have been very light, although one seller points to a gradual improvement throughout January. The jobbing trade has been particularly inactive. Shipments are being maintained at a good level, and the high rate of stove and refrigerator production remains an encouraging factor.

STRUCTURAL STEEL

. . . Lettings 11,400 tons . . . New projects 6500 tons

FABRICATED structural steel lettings at 11,400 tons are only slightly higher than in the previous week. Sizable awards are 1550 tons for State buildings at Willowbrook, N. Y.; 1540 tons for a State highway bridge at Maxville, Mo.; 1530 tons for a material assembly shop for the Navy Yard, Philadelphia, and 1000 tons at Seaford, Del., for a Nylon building for E. I. du Pont de Nemours & Co.

Structural steel projects dropped to 6530 tons from 28,250 tons last week. No new inquiries of more than 770 tons were reported.

General contract for the series of grade crossing eliminations at Dunkirk, N. Y., requiring 3000 tons of shapes, was taken by the C. B. Moon Co., Cleveland.

Willamette Iron & Steel Co., Portland, Ore., is low bidder on intake gates, comprising about 1000 tons of fabricated steel, for the Bonneville project.

TUBULAR GOODS

. . . Oil country pipe orders ahead of a month ago

OIL country goods specifications at PITTSBURGH continue to run somewhat ahead of a month ago in both number of orders and tonnage involved, casing being the most active item. Standard pipe demand is relatively slow but miscellaneous line pipe requirements are holding at a good level. The 150 miles of 12-in. pipe line which was ordered recently by Standard Oil Co. of Ohio involves approximately 14,000 tons of pipe, the order being split evenly between National Tube Co. and Republic Steel Corp. Pipe on this order is now being shipped.

Order backlogs in the CLEVELAND district have improved, particularly in oil country casing, line pipe, and electric weld. Backlogs also are understood to contain a moderate amount of export business.

RAILROAD BUYING

. . . New York Central has tentative equipment program

THE first large scale car buying program to take shape this year is that of the New York Central which has a tentative program calling for the purchase of 25 locomotives and 2000 freight cars, 1000 of which would be for the Pittsburgh & Lake Erie. This program has not yet been formally approved by the board of directors. This system has also inquired for 25 to 40 passenger cars.

The Chilean State Railways last week made the largest motive power purchase of the present year when it closed on 21 locomotives. Eleven of the locomotives were awarded to Baldwin Locomotive Works and 10 went to American Locomotive Co. Other locomotive orders include three diesel-electrics for Northern Pacific, placed with American Locomotive Co., and 10 diesel locomotives for Oliver Iron Mining Co. Three of this latter order

went to Baldwin Locomotive Works and seven were awarded to American Locomotive Co.

Other equipment buying includes a five-car diesel-electric streamlined train for Chicago, Burlington & Quincy, awarded to Edward G. Budd Mfg. Co.; 75 tank cars for General Chemical Co., placed with General American Transportation Corp., and 10 hopper cars for Minneapolis & St. Louis, also going to General American Transportation Corp.

Pending inquiries include 33 stripping cars and three diesel shovels for Oliver Iron Mining Co. Lehigh Valley is building 24 cabooses in its own shops.

Southern Railway has ordered 4000 tons of rail from Bethlehem Steel Co.

MERCHANT BARS

. . . New orders still well below volume of shipments

HOT rolled bar business at PITTSBURGH has dwindled considerably since the first of the year. The past week's volume of specifications was less than that of the week before. Shipments are being maintained at a fast clip and, as a result, bar backlogs are down considerably from the high point at the beginning of December. Some miscellaneous buyers are able to get prompt shipment on larger sizes and, as a result, have adopted a modified hand-to-mouth buying policy. Some increase in business is looked for when automobile concerns place specifications for their March production.

Small sized mills continue to reduce their backlogs at CLEVELAND. Shipping promises from large mills are prompt. Study is being given possible revision of several extras, but the subject is still in the conference stage. Sizable deliveries have been made to the Far East recently.

An encouraging rate of automotive and agricultural machinery production will aid in maintaining merchant bar demand at CHICAGO mills. Drop forgers also are operating well and are prominent consumers. Inquiries are more numerous recently for alloy material, particularly for the automotive industry. Actual new buying is unimproved but heavier purchasing is expected within another two or three weeks.

TIN PLATE

. . . Operations decline to 63%
. . . Mill stocks are large

TIN plate operations are down seven points to 63 per cent. While cold mills are running at a fairly good clip, a considerable number of hot mills have been taken out of operation recently. Ore production at those mills has been cut sharply. Specifications in the past week totaled slightly more from a domestic standpoint than the week before, while export business showed practically no change. Stocks of tin plate at mill warehouses are still in large volume.

The recent extreme weather in the South has inflicted heavy damage on the fruit crops and it is expected that this will be reflected in reduced tinplate demand from that source, particularly in connection with fruit juice canning.

WIRE PRODUCTS

. . . Weather blamed for some of the poor demand

MERCHANT wire demand at PITTSBURGH, although representing an improvement from a month ago, has been held back due to severe weather conditions throughout the country. Producers feel that this delayed buying will materialize in large volume at the first sign of a break in the weather. Wire rod and manufacturers wire requirements are substantially unchanged from a week ago.

New buying at CHICAGO shows little change or improvement, chiefly, it is thought, because numerous consumers have fairly comfortable inventories. There are indications of increased ordering, however, which producing interests expect to materialize within the next two weeks. Automotive and farm equipment interests continue to bolster present demand, although requirements of a number of miscellaneous manufacturing interests are slightly lower seasonally.

CLEVELAND reports merchant wire products sales for spring use slow on the pick up, due to severe cold weather in many parts of the country. Adoption of a zone freight basis for barbed wire probably will be announced soon in an effort to simplify matters for jobbers and producers.

British Steel Prices for Home Trade Are Advanced

LONDON (By Cable) — British home trade prices have been advanced for delivery from Feb. 1 as follows: Pig iron, 3s.; semi-finished, 20s.; black sheets, 27s. 6d.; galvanized sheets, 27s. 6d.; tin plate, 3s. 3d.

Columbus Steam Pump Works Co., 724 W. Gay Street, acquired all the assets of Adco Mfg. Co., manufacturer of hay and paper balers, according to Robin Pulling, general manager of the Steam Pump company. The Adco company formerly was located at 162 W. Spring Street, and has been moved to the plant of the Columbus Steam Pump Works, where the new owners will continue to operate the business. The Adco company has been operating for several years under receivership of W. W. Gard.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Jan. 30, 1940	Jan. 23, 1940	Jan. 2, 1940	Jan. 31, 1939	1940	1939
Fabricated structural steel awards	11,400	10,450	9,000	22,450	55,100	122,350
Fabricated plate awards	360	16,750	3,910	10,755	21,560	24,275
Steel sheet piling awards	0	0	100	850	350	4,560
Reinforcing bar awards	5,530	7,000	6,350	21,515	29,945	63,420
Total Letting of Construction Steel	17,290	34,200	19,360	55,570	106,955	214,605

FABRICATED STEEL

. . . Lettings slightly higher at 11,400 tons as against 10,450 tons last week . . . New projects drop to 6530 tons from 28,250 tons in the previous week . . . Plate awards only 360 tons.

NORTH ATLANTIC STATES
AWARDS

1550 Tons, Willowbrook, N. Y., State power plant and other buildings, to Belmont Iron Works, Philadelphia.
1530 Tons, Philadelphia, Navy Yard, material assembly shop, to American Bridge Co., Pittsburgh.
1000 Tons, Seaford, Del., Nylon building for E. I. du Pont de Nemours & Co., to Bethlehem Steel Co., Bethlehem, Pa.
375 Tons, Harrisburg, Pa., mill building for Central Iron & Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.
250 Tons, W. Burlington, Pa., Bradford County home, to Lehigh Structural Steel Co., Allentown, Pa.
190 Tons, Fort Monmouth, N. J., laboratory and shop buildings, to Bethlehem Steel Co., Bethlehem, Pa.
175 Tons, Philadelphia, ext. oil tempering plant for Midvale Co., to Bethlehem Steel Co., Bethlehem, Pa.
170 Tons, Philadelphia, hammer shop extension for Midvale Co., to Bethlehem Steel Co.
112 Tons, Camden County, N. J., highway project, to Bethlehem Steel Co., Bethlehem, Pa.
105 Tons. Brookline, Mass., Circle Theater, to West End Iron Works, Cambridge, Mass.

SOUTH AND SOUTHWEST

320 Tons, Tucumcari, N. M., State overpass, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.
200 Tons, Plymouth, N. C., addition to North Carolina Pulp Co., to Bethlehem Steel Co., Bethlehem, Pa.

CENTRAL STATES

1540 Tons, Maxville, Mo., State highway bridges, to Stupp Brothers Bridge & Iron Co., St. Louis, through Massman Construction Co.
840 Tons, Winnetka, Ill., eight bridges, Chicago & North Western grade separation, to Duffin Iron Co., Chicago.
550 Tons, Cincinnati, bottling plant for Hudepohl Brewing Co., to Bethlehem Steel Co., Bethlehem, Pa.
385 Tons, Champion, Ill., university power house, to Joseph T. Ryerson & Son, Inc., Chicago.
280 Tons, Evanston, Ill., Patten gymnasium, to Joseph T. Ryerson & Son, Inc., Chicago.
220 Tons, Battle Creek, Mich., State bridge, to Wisconsin Bridge & Iron Co., Milwaukee.
215 Tons, Winnetka, Ill., catenaries for North Shore Line, to Duffin Iron Co., Chicago.
190 Tons, Lansing, Mich., State bridge, to Fort Pitt Bridge Works Co., Pittsburgh.
185 Tons, Middlebranch, Ohio, Diamond Portland Cement Co. building, to Canton Structural Steel, Canton, Ohio.
130 Tons, Quarry, Iowa, Chicago & North Western Railroad bridge, to American Bridge Co., Pittsburgh.
110 Tons, Cleveland, extension to heat treating building for Aluminum Co. of America, to American Bridge Co., Pittsburgh.
105 Tons, Falls City, Neb., bridge FAP-447 (1) to St. Joseph Structural Steel Co., St. Joseph, Mo.
100 Tons, Chicago, remodeling 23rd Street overpass, Chicago Park District, to Bethlehem Steel Co., Bethlehem, Pa.

WESTERN STATES

550 Tons, Denver, 46th Street underpass for State, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

3000 Tons, Dunkirk, N. Y., grade elimination project, C. B. Moon Co., Cleveland, low bidder.
770 Tons, Groton, Conn., plant extension for Electric Boat Co.
700 Tons, Chicopee Falls, Mass., barracks and mess hall for War Department.
600 Tons, Greenville, N. J., transfer bridges Nos. 11 and 12 for Pennsylvania Railroad.
450 Tons, Bound Brook, N. J., warehouse for Calco Chemical Co.
440 Tons, Amcelle, Md., building extension for Celanese Corp. of America.
380 Tons, Willowbrook, N. Y., State buildings Nos. 4 and 18.
225 Tons, New York, reconstruction, Cross Bay Boulevard for New York City Parkway Authority.
165 Tons, Elmhurst, N. Y., St. Gabriels Parish, school building.
110 Tons, Orangeburg, N. Y., addition to State laundry building.
110 Tons, Queens, N. Y., bridge alterations.
110 Tons, New York, bridge alteration, 163rd Street and Third Avenue.

SOUTHWEST

135 Tons, Espanola, N. M., State bridge FAP-21-D.

CENTRAL STATES

1200 Tons, Dayton, Ohio, power house and wind tunnel for War Department; National Concrete Fireproofing Co., Cleveland, low bidder.
320 Tons, Savanna, Ill., Proving Ground, Army welded bomb dunnages; bids Feb. 8.
275 Tons, Detroit, apartment house for 9000 Jefferson Avenue East Corp.
210 Tons, Cleveland, building, for Lindsay Wire Weaving Co.
200 Tons, Cleveland, addition for Cleveland Pneumatic Tool Co.
110 Tons, Gary, Ind., housing project for Gary Housing Commission.

WESTERN STATES

1000 Tons, Bonneville, Ore., intake gates; Willamette Iron & Steel Co., Portland, Ore., low bidder. (Project previously reported.)
591 Tons, Bonneville, Ore., trashracks and accessories for powerhouse; bids Feb. 16.
295 Tons, South Pasadena, Cal., Fremont Avenue undercrossing; bids Feb. 23.
225 Tons, Long Beach, Cal., oil derricks for Hansen Oil Corp., and Union Pacific Railroad Co.; building permits applied for.
110 Tons, Arsenal, Utah, garage and shop for Government.

FABRICATED PLATES

AWARDS

200 Tons, Bonneville, Ore., caisson, to Puget Sound Machinery Depot, Seattle.
160 Tons, Petrolia, Pa., Daugherty refinery, three 50 x 30-ft. tanks, to Hammond Iron Works, Warren, Pa.

PENDING PROJECTS

500 Tons, Parker, Colo., radial gates for Colorado River FO-54 for Indian Irrigation Service.

SHEET PILING

PENDING PROJECTS

540 Tons, Cleveland, U. S. Lake survey; bids Feb. 16.
500 Tons, Cleveland, cut No. 9-A, Cuyahoga River straightening project; Western Foundation Co., Chicago, low bidder.

REINFORCING STEEL

. . . Awards of 5530 tons; 3200 tons in new projects

ATLANTIC STATES
AWARDS

750 Tons, Coney Island, New York, city disposal plant, to Bethlehem Steel Co., Bethlehem, Pa.; Stock Construction Co., contractor.
600 Tons, Staten Island, N. Y., Willowbrook State Hospital buildings, to Capital Steel Corp., New York.
550 Tons, Philadelphia, buildings for City Trusts, to American Steel Engineering Co., Philadelphia.
500 Tons, Washington, Massachusetts Avenue bridge, to Bethlehem Steel Co., Bethlehem, Pa.; through Hudson Supply & Equipment Co.; Potts & Callahan, contractors.
420 Tons, York, Pa., dam for War Department, to Bethlehem Steel Co., Bethlehem, Pa.
238 Tons, Orange County, N. Y., grade elimination, to Truscon Steel Co., Youngstown, through Lane Construction Co., contractor.
125 Tons, Indian Orchard, Mass., Chapman Valve Mfg. Co., shop foundations, to Concrete Steel Co., Boston, E. F. Carlsen, Inc., Springfield, Mass., contractor.
110 Tons, Stonington, Conn., State bridge, to Truscon Steel Co., Youngstown; A. J. Savin Construction Co., Hartford, Conn., contractor.

CENTRAL STATES

900 Tons, Chicago, Central Avenue viaduct, to Inland Steel Co, Chicago; Thomas McQueen Co., contractor.
563 Tons, Williamsburg, Va., highway tunnel, to Virginia Steel Co., Richmond, Va.; through J. G. Attaway Construction Co., Statesboro, Ga., contractor.
200 Tons, Chicago, Western Avenue bridge and viaduct, to O. J. Dean Co., Chicago.
188 Tons, Chicago, bridge and viaduct, 31st Street and Western Avenue, to Republic Steel Corp., Cleveland.
115 Tons, McLain County, Mo., highway bridge, Route 5, to Missouri Rolling Mill Corp., St. Louis.

WESTERN STATES

774 Tons, Hawthorne, Nev., Navy magazine buildings (Specification 9396), to Columbia Steel Co., San Francisco, through William P. Neil Co., Los Angeles, contractor. Previously reported to Truscon Steel Co.
162 Tons, Los Angeles, Woodrow Wilson High School, to Consolidated Steel Co., Los Angeles; through W. J. Shirley, Los Angeles, contractor.
103 Tons, San Jose, Cal., Polhemus Street underpass, to San Jose Steel Co., through Earl Heple, San Jose, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

230 Tons, New York, East River housing project; bids in.
225 Tons, Staten Island, N. Y., Willowbrook State Hospital, bids in.
114 Tons, Dunkirk, N. Y., grade elimination. C. B. Moon Co., Cleveland, low bidder.
100 Tons, Weston, Mass. Charles River water works shaft.

CENTRAL STATES

1000 Tons, Detroit, Fred Sanders plant.
600 Tons, Gary, Ind., Delaney Community housing project; bids Feb. 15.
327 Tons, Cleveland, public opening, for city; Patterson-Leitch Co., Cleveland, low bidder.
300 Tons, Dayton, Ohio, wind tunnel for War Department. National Concrete Fireproofing Co., Cleveland, low bidder.
150 Tons, Detroit, animal building for Parke Davis, Inc.

WESTERN STATES

132 Tons, South Pasadena, Cal., Fremont Avenue undercrossing; bids Feb. 23.

Wire Plant Men Get $4,500 Back Pay, SWOC Announces

COLUMBUS, Ohio—Philip Murray, chairman of the SWOC, told a meeting of Ohio steel workers Jan. 27 that around $4,500 in adjusted pay had been given 31 workers by American Steel & Wire Co. at its Donora, Pa., plant. The action resulted from study of tonnage produced in the barbed wire department and had nothing to do with the general wage rate structure.

. . . NON-FERROUS . . .

. . . Copper dropped 3/8c. to 11.625c. lb. . . . Lead cut $5 a ton to 5.25c. lb., New York . . . Spelter unchanged . . . Uncertainty caused by price changes keeps buying very light.

NEW YORK, Jan. 30—Following close upon a $10 slash two weeks ago, copper prices were cut another $7.50 a ton last Friday, bringing quotations down to a basis of 11.625c. per lb., Connecticut Valley delivery. This latest reduction was also instigated by a custom smelter and up to the time of going to press had not been met by the mine producers, who continue to quote 12c. per lb. The reduction had no observable influence on demand, except serving to heighten the caution of buyers in the face of such price uncertainties. Sales of the red metal on Friday amounted to only 275 tons and on Saturday were eight tons. Despite the extended dull demand of the past month, nearby metal in important tonnages is still rather scarce. Export inquiry was fairly active during the week, but actual bookings were very small. Inquiries from France and England include armored cable and rods. Prompt metal for export is quoted at around 11.60c. per lb., f.a.s., while March shipment can be had for 11.40c.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Jan. 24	Jan. 25	Jan. 26	Jan. 27	Jan. 29	Jan. 30
Copper, Electrolytic[1]	12.00	12.00	11.625	11.625	11.625	11.625
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York	45.25	45.375	45.625	....	46.00	45.875
Zinc, East St. Louis[2]	5.50	5.50	5.50	5.50	5.50	5.50
Lead, St. Louis[3]	5.35	5.35	5.35	5.35	5.10	5.10

[1] Delivered Conn. Valley. Deduct 1/4c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	47.25c.	48.00c.
Copper, Lake	13.25c.	13.125c.
Copper, electro	12.75c.	13.125c.
Copper, castings	12.375c.	12.875c.
*Copper sheets, hot-rolled	20.62c.	20.62c.
*Yellow brass sheets	18.65c.	18.65c.
*Seamless brass tubes	21.40c.	21.40c.
*Seamless copper tubes	21.12c.	21.12c.
*Yellow brass rods	14.57c.	14.57c.
Zinc slabs	6.85c.	7.50c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.25c.	5.75c.
Lead, bar	8.70c.	8.50c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.00c.	19.50c.
Solder, 1/2 and 1/2	29.00c.	28.125c.
Babbitt metal, anti-friction grade	27.50c.	20.00c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.375c.	10.00c.
Copper, hvy. and wire	8.375c.	8.75c.
Copper, light and bottoms	7.375c.	7.875c.
Brass, heavy	5.125c.	5.625c.
Brass, light	4.25c.	5.00c.
Heavy machine composition	7.375c.	8.00c.
No. 1 yel. brass turnings	5.875c.	5.375c.
No. 1 red brass or compos. turnings	7.00c.	7.50c.
Lead, heavy	4.50c.	4.875c.
Cast aluminum	8.50c.	9.50c.
Sheet aluminum	13.75c.	14.75c.
Zinc	3.125c.	4.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $157 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12.25c. a lb.

Lead

Despite its strong statistical position, the lead market was unable to overcome the depressing influence of the price weakness in zinc and copper and a leading selling interest on Monday announced a reduction of $5 a ton to a basis of 5.25c. per lb., New York. This is the first price movement in lead since early September when quotations were raised to 5.50c., New York, where they remained until Monday. The reduction did not bring out any better demand and buying all week was limited to occasional February carlots. March books were opened Monday, but buyers have shown no interest in that month as yet. About half of February's needs have yet to be purchased.

Zinc

The uncertainty engendered by the recent price reduction was reflected in the past week's sales report which showed that sales of the prime Western grade had dropped to 976 tons from 1235 tons in the week previous. Shipments, however, are holding up remarkably well, the week's total of 5057 showing a slight increase over the previous week's figure of 5008 tons. Sales are limited to carlots and consumers appear to be drawing heavily from stocks. The low level of undelivered orders, which at the end of the past week stood at 34,528 tons, would indicate that inventories have been worked down below what is usually considered a normal level. Quotations, meanwhile, remain unchanged at 5.89c. per lb., New York.

Tin

Hardening of the sterling exchange rate and the rise of rumors that the International Control committee might lower quotas in the next quarter caused Straits prices to move up slightly during the past week and some scattered buying was done on the rise. Prompt Straits are quoted today at 45.875c. per lb., New York, as compared with 45c. a week ago. The London market also moved up in the week as the British Government began issuing import licenses on a limited scale. Cash standards this morning in London were priced at £238 5s, a gain of about £6.

Safway Steel Scaffolds Co. has entered into a contract for the sale and distribution of the entire line of the American Tubular Elevator Co., Pittsburgh, with an option to purchase the company within three years, according to an announcement from David Beatty, vice-president.

A. M. Byers Co. reports net profit of $241,757 for the three months ended Dec. 31, 1939, compared with $286,478 for the quarter ended Sept. 30. This compares with a net loss of $46,599 in the December quarter of 1938.

IRON AND STEEL SCRAP

. . . Decline of 21c. in the composite price to $17.33 reflects general softness in the market.

JAN. 30—Published reports of the sale of 800,000 tons of scrap to Great Britain for shipment from Jacksonville, Fla., are wholly without foundation, THE IRON AGE is authoritatively informed. All shipments to Great Britain since Nov. 1 have been on a sliding scale contract, based on THE IRON AGE scrap composite price, and it appears that this method will continue to be followed as it has worked out satisfactorily for both buyers and sellers.

Again the domestic market this week is characterized by softness and general lack of mill buying on any sizable scale. Small sales at Pittsburgh have driven the average price of No. 1 down 25c., and broker coverages on the last mill sale at Chicago warrant a drop of 12½c. in the average there. There has been greater activity at Philadelphia, and although some of the information is conflicting, the widening of the range to $1 has resulted in a drop of 25c. in the quoted average. As a result of these movements, the composite price has declined 21c. from last week, to $17.33, or 34c. below the figure that prevailed for weeks around the end of the year.

Many markets like Cleveland and Buffalo are at a standstill as regards sales, and a few items are quoted at a lower price. Sales of automotive scrap at Detroit showed an unexpected strength, but dealers at Cincinnati are bearish and have lowered all prices 50c.

Philadelphia

Purchase of a tonnage of No. 1 steel at $17 and No. 2 at $16 by a mill in the Harrisburg area makes No. 1 steel quotable this week at $17 to $18 and No. 2 material $16 to $16.50. Another district consumer is offering $16 for No. 2 but as yet has not acquired any material at that price. Brokers, on the other hand, have paid recently up to $17 covering on this grade and $18 on No. 1. Other price revisions during the week included No. 1 blast furnace material, down 75c., cast borings, down 50c., and forge fire, down $1. The cold weather continues to restrict collection of scrap and most yard stocks are low, but the lack of important buyer interest has nullified the usual strengthening influence of such a stock position. Some small tonnages were bought for export during the week, with $17 to $17.25 being paid for No. 1 material and $16 for No. 2. This scrap was for a boat due since early December. The January list of the Pennsylvania Railroad covers 25,800 tons, including 7000 tons of No. 1 steel.

Pittsburgh

The ability of some brokers to obtain cars of No. 1 heavy melting at $18 a ton, even though the amount of material is not large, causes No. 1 heavy melting this week to be quoted at $18 to $18.50, down 25c. a ton from last week's average and at the level existing previous to the flurry brought on by weather conditions. Some secondary grades are softer this week. Transactions on primary grades are few and far between. Clarification is expected when railroad lists close soon.

Chicago

The market definitely has weakened and No. 1 heavy melting steel now is quoted at $16 to $16.50. This range represents both the latest price paid by a mill, $16.50, and also the current dealer-broker trading at $16. Easing off was attributed to declining mill operations and the fact that only one steel mill has been an active buyer in the market. With the market currently on the soft side, many members of the trade foresee a further easing of price in the near future.

Youngstown

The market remains quiet here after the drop to $18 per ton for No. 1 last week. Strength at Ohio River points and other places, including Detroit, where Hudson bundles are reported to have brought 50c. higher this week, has not penetrated to the Valley.

Cleveland

Except for blast furnace grades, which are down another 50c. this week, quotations are unchanged. Although foundry grades have been fairly active, the rest of the market is at a standstill pending the outcome of the monthly railroad lists. The first list out contains only around 18 cars. Roads have been delayed from pulling rails due to the adverse weather.

Cincinnati

With unusually severe weather conditions retarding the movement of scrap to and from yards, market weaknesses have not become as vivid as dealers believe they actually are. While the prices continue to be nominal, dealers have reduced bids 50c. a ton on all types of scrap, but indicate that were weather conditions such that the normal flow of material would be possible, present lack of mill interest in purchases would of necessity indicate an even greater cut in bids. Some small amounts of scrap are reported to have moved on continuing commitments but this has not been great.

Buffalo

Despite absence of sales and the falling off in mill operations, the market shows no weaker tendencies. No. 1 heavy melting steel is quoted at $17 to $17.50 and mill bids have not been changed. One mill here is holding up shipments. Cast scrap is moving in small quantities.

St. Louis

Shipments by railroads of scrap iron bought recently, which had been held back because of the sub-zero weather, began to move in large amounts, easing the situation here. A few items are lower and a few others are higher. Railroad lists: Pennsylvania, 25,000 tons; Chicago, Milwaukee, St. Paul & Pacific, 3200 tons.

Detroit

The first sales of February scrap accumulations from auto plants indicated an unexpected solidity in price, thus maintaining Detroit quotations at the same level as recent weeks. Estimates of scrap output during February are down about 20 per cent from January levels as auto plants reduce production seasonally. The principal consumer in this area maintains a hand-to-mouth buying policy and every smaller consumer is in line with this.

Birmingham

No changes have been recorded in the scrap market and the market is very sluggish. For the past few days the coldest weather in Birmingham's history has been experienced with heavy snow in all sections.

New York

There has been some inquiry for export but no new business has been transacted. Domestic inquiry has also picked up, and a sale of around 8000 tons of Nos. 1 and 2 steel and other grades to an eastern Pennsylvania mill is reported at a delivered price of $18.75 a ton for the No. 1 steel. Buying prices for both domestic and export scrap are unchanged.

Boston

Following a wait of many weeks, a local exporter has been given a boat to load for England. Another exporter expects a boat this week, but there is nothing certain on that point. Exporters have sufficient scrap on hand and earmarked to load quite a few boats. In the meantime the domestic market is virtually at a standstill.

Toronto

General conditions in the iron and steel scrap markets showed little change from the preceding week. Dealers state that offerings of scrap are practically at a standstill with only small tonnages entering yards. Deliveries against contract are responsible for good movement of scrap to consumers, but little interest is reported in new buying either for spot or future delivery, but under existing prices dealers are making no special effort to obtain new business.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$18.00 to $18.50
Railroad heavy melting	$19.00 to 19.50
No. 2 heavy melting	16.50 to 17.00
Railroad scrap rails	19.00 to 19.50
Rails 3 ft. and under	22.00 to 22.50
Comp. sheet steel	18.00 to 18.50
Hand bundled sheets	17.00 to 17.50
Heavy steel axle turn.	16.50 to 17.00
Machine shop turnings	12.00 to 12.50
Short shov. turnings	13.50 to 14.00
Mixed bor. & turn.	11.50 to 12.00
Cast iron borings	11.50 to 12.00
Cast iron carwheels	18.50 to 19.00
Heavy breakable cast.	15.00 to 15.50
No. 1 cupola cast	18.50 to 19.00
RR. knuckles & coup.	21.50 to 22.00
Rail coil springs	22.00 to 22.50
Rail leaf springs	22.00 to 22.50
Rolled steel wheels	22.00 to 22.50
Low phos. billet crops.	23.50 to 24.00
Low phos. punchings	21.50 to 22.00
Low phos. heavy plate.	21.00 to 21.50
Railroad malleable	21.50 to 22.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$17.00 to $18.00
No. 2 hvy. mltng. steel	16.00 to 16.50
Hydraulic bund., new	17.50 to 18.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	21.50 to 22.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast	.... 18.00
No. 1 cupola cast	20.00 to 20.50
Mixed yard cast (f'd'y) scrap	17.00 to 17.50
Stove plate (steel wks.)	.... 15.00
Railroad malleable	.... 22.00
Machine shop turn	.... 12.00
No. 1 blast furnace	10.00 to 10.50
Cast borings	11.00 to 11.50
Heavy axle turnings	15.00 to 15.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.50 to 22.00
Steel axles	.... 22.50
Shafting	23.00 to 23.50
Spec. iron & steel pipe	.... 17.50
No. 1 forge fire	15.00 to 15.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$16.00 to $16.50
Auto. hvy. mltng. steel alloy free	15.00 to 15.50
No. 2 auto steel	12.00 to 12.50
Shoveling steel	16.25 to 16.50
Factory bundles	15.25 to 15.75
Dealers' bundles	13.75 to 14.25
No. 1 busheling	14.75 to 15.25
No. 2 busheling, old	6.00 to 6.50
Rolled carwheels	18.50 to 19.00
Railroad tires, cut	19.00 to 19.50
Railroad leaf springs	18.50 to 19.00
Steel coup. & knuckles	18.50 to 19.00
Axle turnings	15.00 to 15.50
Coil springs	19.50 to 20.00
Axle turn. (elec.)	17.00 to 17.50
Low phos. punchings	19.50 to 20.00
Low phos. plates 12 in. and under	19.00 to 19.50
Cast iron borings	8.50 to 9.00
Short shov. turn.	10.00 to 10.50
Machine shop turn.	8.50 to 9.00
Rerolling rails	19.00 to 19.50
Steel rails under 3 ft.	19.00 to 19.50
Steel rails under 2 ft.	19.50 to 20.00
Angle bars, steel	18.00 to 18.50
Cast iron carwheels	16.50 to 17.00
Railroad malleable	18.50 to 19.00
Agric. malleable	14.50 to 15.00
	Per Net Ton
Iron car axles	21.75 to 22.25
Steel car axles	20.50 to 21.00
Locomotive tires	14.50 to 15.00
Pipes and flues	11.00 to 11.50
No. 1 machinery cast	13.75 to 14.25
Clean auto. cast	14.00 to 14.50
No. 1 railroad cast	13.25 to 13.75
No. 1 agric. cast	11.50 to 12.00
Stove plate	9.00 to 9.50
Grate bars	9.50 to 10.00
Brake shoes	11.00 to 11.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$17.50 to $18.00
No. 2 hvy. mltng. steel	16.50 to 17.00
Low phos. plate	20.50 to 21.00
No. 1 busheling	16.75 to 17.25
Hydraulic bundles	17.00 to 17.50
Machine shop turn.	11.00 to 11.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$17.00 to $17.50
No. 2 hvy. mltng. steel	16.00 to 16.50
Comp. sheet steel	16.50 to 17.00
Light bund. stampings	13.50 to 14.00
Drop forge flashings	15.00 to 15.50
Machine shop turn.	9.50 to 10.00
Short shov. turn.	10.50 to 11.00
No. 1 busheling	15.75 to 16.25
Steel axle turnings	15.00 to 15.50
Low phos. billet and bloom crops	22.50 to 23.00
Cast iron borings	10.50 to 11.00
Mixed bor. & turn.	10.50 to 11.00
No. 2 busheling	10.50 to 11.00
No. 1 cupola cast	18.50 to 19.00
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50
Rails under 3 ft.	22.00 to 22.50
Rails for rolling	21.00 to 21.50
Railroad malleable	21.00 to 21.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$17.00 to $17.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Scrap rails	17.50 to 18.00
New hvy. b'ndled sheets	15.00 to 15.50
Old hydraul. bundles	13.50 to 14.00
Drop forge flashings	15.00 to 15.50
No. 1 busheling	15.00 to 15.50
Machine shop turn.	10.50 to 11.00
Shov. turnings	13.00 to 13.50
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Knuckles & couplers	21.00 to 22.00
Coil & leaf springs	21.00 to 22.00
Rolled steel wheels	21.00 to 22.00
No. 1 machinery cast	18.00 to 18.50
No. 1 cupola cast	17.00 to 17.50
Stove plate	15.00 to 15.50
Steel rails under 3 ft.	22.50 to 23.00
Cast iron carwheels	18.00 to 18.50
Railroad malleable	19.50 to 20.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$15.00 to $15.50
No. 1 hvy. melting	15.00 to 15.50
No. 2 hvy. melting	14.00 to 14.50
No. 1 locomotive tires	15.75 to 16.25
Misc. stand sec. rails	15.00 to 15.50
Railroad springs	17.00 to 17.50
Bundled sheets	10.00 to 10.50
No. 1 busheling	13.75 to 14.25
Cast bor. & turn.	6.50 to 7.00
Machine shop turn.	7.00 to 7.50
Heavy turnings	10.50 to 11.00
Rails for rolling	17.75 to 18.25
Steel car axles	18.75 to 19.25
No. 1 RR. wrought	11.00 to 11.50
No. 2 RR. wrought	14.50 to 15.00
Steel rails under 3 ft.	19.00 to 19.50
Steel angle bars	16.00 to 16.50
Cast iron carwheels	17.00 to 17.50
No. 1 machinery cast	17.75 to 18.25
Railroad malleable	16.50 to 17.00
Breakable cast	14.50 to 15.00
Stove plate	11.00 to 11.50
Grate bars	10.50 to 11.00
Brake shoes	11.00 to 11.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$13.50 to $14.00
No. 2 hvy. mltng. steel	11.50 to 12.00
Scrap rails for mltng.	17.50 to 18.00
Loose sheet clippings	9.00 to 9.50
Hydrau. b'ndled sheets	13.00 to 13.50
Cast iron borings	4.50 to 5.00
Machine shop turn.	5.50 to 6.00
No. 1 busheling	10.00 to 10.50
No. 2 busheling	3.50 to 4.00
Rails for rolling	19.00 to 19.50
No. 1 locomotive tires	15.00 to 15.50
Short rails	20.50 to 21.00
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast	17.00 to 17.50
No. 1 railroad cast	15.00 to 15.50
Burnt cast	8.50 to 9.00
Stove plate	8.50 to 9.00
Agricul. malleable	13.50 to 14.00
Railroad malleable	16.50 to 17.00
Mixed hvy. cast	14.50 to 15.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$16.00
No. 2 hvy. melting steel	15.00
No. 1 busheling	13.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	20.00
No. 1 RR wrought	14.00
No. 1 cast	15.00
No. 2 cast	11.00
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$13.00 to $13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
Borings and turnings	7.00 to 7.50
Long turnings	6.50 to 7.00
Short shov. turnings	8.50 to 9.00
No. 1 machinery cast	13.50 to 14.00
Automotive cast	15.00 to 15.50
Hvy. breakable cast	10.50 to 11.00
Stove plate	9.00 to 9.50
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel	12.50 to 13.00
Sheet clippings	8.75 to 9.75
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$13.50 to $14.00
No. 2 hvy. mltng. steel	12.00 to 12.50
Hvy. breakable cast	.... 14.00
No. 1 machinery cast	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	19.00 to 20.00
Clean steel turnings*	7.50 to 8.00
Cast borings*	8.00 to 9.00
No. 1 blast furnace	8.00 to 9.00
Cast borings (chem.)	Nominal
Unprepared yard scrap	7.50 to 8.00
Light iron	5.00 to 5.50
Per gross ton, delivererd local foundries:	
No. 1 machin. cast	$17.50 to $19.25
No. 2 cast	16.50 to 17.00

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton

Breakable cast	$13.00 to $13.15
Machine shop turn.	7.15 to 7.55
Mixed bor. & turn.	5.50 to 5.75
Bun. skeleton long	9.75 to 10.25
Shafting	18.25 to 18.50
Stove plate	9.65 to 9.75
Cast bor. chemical	9.00 to 9.50
Per gross ton delivered consumers' yards:	
Textile cast	$17.00 to $19.00
No. 1 machine cast	17.00 to 19.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel	$13.00 to $13.50
No. 2 steel	12.00 to 12.50

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	.... $16.00
No. 2 hvy. mltng. steel	.... 15.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$11.50	$11.00
No. 1 hvy. mltng. steel	11.00	10.50
No. 2 hvy. mltng. steel	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	5.50	5.00
Scrap pipe	7.75	7.25
Steel turnings	6.00	6.00
Cast borings	6.00	5.50
Machinery cast	17.00 to 16.50	
Dealers' cast	16.00 to 15.50	
Stove plate	12.00 to 11.50	

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barge:

No. 1 hvy. mltng. steel	$14.00 to $14.50
No. 2 hvy. mltng. steel	12.00 to 12.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 ....

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	14.00 to 14.50
Rails (scrap)	.... 15.50
Stove plate	8.65 to 8.75

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel	$17.00 to $17.25
No. 2 hvy. mltng. steel	.... 16.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesvile, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago or Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.45c.
Galveston	2.25c.

9/32 in. to 47/64 in. $3 a net ton higher. Quantity extras apply.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.15c.
Detroit, delivered	2.25c.
Duluth	2.25c.
Philadelphia, delivered	2.47c.
New York	2.49c.
On cars dock Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15c.
On cars dock Tex. Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	2.15c.
Detroit, delivered	2.25c.
On cars dock Tex. Gulf ports	2.50c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.
On cars dock Tex. Gulf ports	2.50c.
On cars dock Pacific ports	2.50c.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary	2.65c.
Detroit	2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P'tg	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.10c.
Detroit, delivered	2.20c.
Philadelphia, delivered	2.27c.
Granite City	2.20c.
On cars dock Pacific ports	2.60c.
Wrought iron, Pittsburgh	4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.05c.
Detroit, delivered	3.15c.
Granite City	3.15c.
Philadelphia, delivered	3.37c.
On cars dock Pacific ports	3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.80c.
F.o.b. cars dock Pacific ports	4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

Tin Plate

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.40
Pittsburgh or Gary	4.30

Roofing Terne Plate
(F.o.b. Pittsburgh per Package, 112 sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.10c.
Detroit, delivered	2.20c.
On cars dock Pacific ports	2.70c.

Cooperage Stock

Pittsburgh & Chicago	2.20c.

COLD ROLLED STRIP*

	Base per Lb
Pittsburgh, Youngstown or Cleveland	2.80c.
Chicago	2.90c.
Detroit, delivered	2.90c.
Worcester	3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.95c.
Detroit, delivered	3.05c.
Worcester	3.35c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05
Galvanized fence wire	3.30
Twisted barbless wire	3.40
Woven wire fence, 12½ gage and lighter, base col.	67
Woven wire fence, 7, 9 and 11 gage base col.	67
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	$2.70
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool	$2.88

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	56	36	¼ & ⅜	+9	+30
¼ to ⅜	59	43½	½	24	6½
½	63½	54	¾	30	13
¾	66½	58½	1 & 1¼	34	19
1 to 3	68½	60½	1½	38	21½
			2	37½	21

Lap Weld

2	61	52½	2	30½	15
2½ & 3	64	55½	2½ to 3½	31½	17½
3½ to 6.66		57½	4	33½	21
7 & 8.65		55½	4½ to 8.32	1½	20
9 & 10.64	1½	55	9 to 12	28½	15
11 & 12.63	1½	54			

Butt weld, extra strong, plain ends

⅛	54½	41½	¼ & ⅜	+10	+43
½ to ⅜	56½	45½	½	25	9
½	61½	53½	¾	31	15
¾	65½	57½	1 to 2	38	22½
1 to 3	67	60			

Lap weld, extra strong, plain ends

2	59	51½	2	33½	18½
2½ & 3	63	55½	2½ to 4.39½		25½
3½ to 6.66	1½	59	4½ to 6.37½		24
7 & 8.65	1½	56	7 & 8	38½	24½
9 & 10.64	1½	55	9 to 12	32	20½
11 & 12.63	1½	54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d. 13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2½ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2¾ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	30%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham.	46.00
6-in. an dlarger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45, Birmingham, and $53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. incl.	62
1⅝ in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. and larger	62	62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83½

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ...65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (1½% Nickel)	$0.35
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
31 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chro.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Coled-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot stp.	17c.	17.50c.	24c.	35c.
Cold stp.	22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	31s. 6d.
Steel bars, open hearth	12£ 5s.*
Beams, open hearth	11£ 2s. 6d.*
Channels, open hearth	11£ 7s. 6d.*
Angles, open hearth	11£ 2s. 6d.*
Black sheets, No. 24 gage	15£ 12s. 6d. max.*
Galvanized sheets, No. 24 gage	18£ 2s. 6d. max.*

* Empire markets only.

CONTINENTAL

Per Gross Ton, Belgian Francs
f.o.b. Continental Ports

Bars, merchant	1500
Plates	1750
Joists	1475
Sheets, thin	1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati	23.06
Northern, delivered, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo	$28.50

Gray Forge

Valley or Pittsburgh furnace	$22.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Montreal

Foundry iron	$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto

Foundry iron	$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots, packed)	82.00*
75% (carload lots, bulk)	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$32.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	11.00c.*
2% carbon	17.50c.*
1% carbon	18.50c.*
0.10% carbon	20.50c.*
0.06% carbon	21.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$98.00
2.50% carbon	103.00
2% carbon	108.00
1% carbon	118.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo. f.o.b. Langeloth, Pa.	80c.

* Spot prices are $5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%	$5.25
Old range, non-bessemer, 51.50%	5.10
Mesaba, bessemer, 51.50%	5.10
Mesaba, non-bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe	12c.
Swedish, low P, 68% Fe	12c.
Swedish, basic or foundry, 65% Fe	11c.
Caucasian, washed, 52% Mn	53c.
African, Indian, 44 to 48% Mn	46c.
African, Indian, 49 to 51% Mn	48c.
Brazilian, 46 to 48% Mn	44c.
Cuban, del'd, duty free, 51% Mn	60c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$23.00 to $24.00
Tungsten, domestic, scheelite delivered	23.00 to 25.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$19.00
Rhodesian, 45%	22.00
Rhodesian, 48%	26.00 to $27.00
Turkish, 48-49%	27.00 to 28.00
Turkish, 45-46%	25.00 to 26.50
Turkish, 40-41%	22.00
Chrome concentrates c.i.f. Atlantic Seaboard, per gross ton: Turkish, 48-49%	$27.00 to $28.00

* All foreign ore prices are nominal

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$21.00
Domestic, f.o.b. Ohio River landing barges	21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	$20.00 to 22.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	$25.00 to $25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	$31.00
ditto, in bags, f.o.b., same mines	$32.60

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne, N. J.	5.10c.
No. 6, f.o.b. Bayonne, N. J.	3.57c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.25c.
No. 4 industrial, del'd Cleve'd.	5.00c.
No. 5 industrial, del'd Cleve'd.	4.25c.
No. 6 industrial, del'd Cleve'd.	3.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$4.00 to $4.25
Foundry, f.o.b. Connellsville, Prompt	5.50 to 5.75
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England	12.50
Foundry, by - product del'd Newark or Jersey City	11.38 to 11.90
Foundry, by - product Philadelphia	11.13
Foundry, by- product delivered Cleveland	11.05
Foundry, by - product delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by - product del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

U.S. Steel Ore Sale Focuses Attention on Other Raw Material

NEW YORK—The open market sale of iron ore to Ford Motor and the more recent sale of a small amount of coal into regular trade channels at PITTSBURGH by the U. S. Steel Corp. has focused attention on the company's raw material sales policy.

In spite of reports that steel will soon actively sell limestone and ferromanganese, these two materials have been sold in the open market by corporation subsidiaries for a number of years. Limestone had been purchased from the corporation by outside interests as long as 20 years ago.

The furore raised a week or so ago when the ore sale became known is similar to that which occurred when the corporation, through its subsidiaries, started to sell merchant pig iron a great number of years ago.

While all sorts of conjectures have been raised as the ultimate result of the first and subsequent ore sale and coal sales—the latter so far involving a very small amount—the actual reason for this extension in the corporation's policy with regard to raw materials sales probably simmers down to the desire to obtain the greatest return possible on productive capacities. This is especially true in the Minnesota ore regions, where the corporation apparently wants to mine and move as much ore as possible before present leases expire.

Although open market activity involving ore is new, it follows the same pattern as occurred in the initial sale of pig iron, limestone and ferromanganese years ago. Or again it is similar to the activity of the corporation's railroads and ocean lines which serve as common carriers, but the addition of ore and coal to the list now makes the corporation competitive in all products it produces.

The reason for the lapse in the time between the selling of pig iron and limestone and the recent ore selling policy probably springs from a closer study and knowledge of the company's ore requirements over the next 10 or 20 years. The advertisement of the Oliver Iron Mining Co. offering long term contracts is proof that the corporation is definitely in the market for no short period.

Although reactions following the latest developments in the corporation's raw material sales policy have been widespread and in some cases bordering on alarm, so far opinions on probable results have been purely speculative. There appears however to be a resemblance between the latest moves of the corporation and the one made in June, 1938, when steel prices were dropped suddenly with the statement that it was being done to meet competitive conditions. Further light on the action may be apparent when considered in relation to the comparatively recent formation of the U. S. Steel Corp. of Delaware. It has been called a management group and as such is more or less responsible for the coordination of all corporation subsidiaries, which is another way of saying the best possible productive experience from productive capacities.

U.S. Steel Quarterly Income $28,835,282

THE better demand for steel products which prevailed during the fourth quarter of 1939 caused a substantial improvement in the earnings of the U. S. Steel Corp., E. R. Stettinius, Jr., chairman of the board, reported Tuesday. The quarter's net income, after interest, depreciation and taxes, was $28 835,282, as compared with $10,420,445 in the third quarter and $4,394,454 in the last quarter of 1938. For the year 1939, earnings totaled $41,226,039, against a loss of $4,787,454 for 1938, and a profit of $94,944,358 in 1937. The directors declared the regular preferred dividend of $1.75 per share.

The 1939 earnings were equivalent to $1.83 per common share, after preferred dividend deductions, as compared with a loss of $3.78 a common share in 1938 and a profit of $8.01 per common share in 1937. Despite the improvement in earnings in 1939, they were not sufficient to offset the 1938 deficit, after preferred requirements, of $32,937,131.

Shipments of finished steel in the fourth quarter totaled 3,793,723 tons, or 84.3 per cent of capacity, as compared with 2,465,161 tons or 54.6 per cent in the third quarter. Shipments in 1939 were 10,652,150 tons, or 59.5 per cent, as against 6,655,749 tons or 36.7 per cent in 1938. Shipments in 1937 were 12,748,354 tons or 71 per cent.

Structural Awards In '39 103.9% of 1938 Contracts

NEW contracts for fabricated structural steel closed during 1939 were 103.9 per cent of the contracts closed during 1938, according to reports received by the American Institute of Steel Construction. The shipments of finished orders amounted to 1,440,054 tons, in comparison with 1,158,763 tons shipped in 1938. The new business booked in 1939 represents 48.8 per cent of the average bookings for the years 1923-1925, both inclusive (2,675,000 tons) as compiled by the U. S. Department of Commerce.

The estimate of 1940 orders is 1,350,000 tons.

No Check-Off, Closed Shop In Crucible-SWOC Contract

PITTSBURGH—Crucible Steel Co. of America and the SWOC have signed a contract recognizing the union for employees who are members.

The contract did not provide for the check-off of dues and the union shop which the SWOC had requested in its first demand for these concessions from a large steel company. Some special provisions call for adjustment of inequalities in wage rates arising out of piece work and incentive rates. Changes in equipment or production requirements are to be negotiated between local committees and plant officials.

Employees who report for work and find no work available through negligence on the part of the company will be paid for 4 hr. work. Furloughed employees retain seniority for one year and in layoffs, employees with less than 6 months' service will be furloughed first. A 21-day limit has been set on arbitration of grievance cases.

Need for Increased Highway Construction cited

CHICAGO—between 45,000 and 50,000 are in attendance here at the 37th annual road show and convention, American road builders association, Jan. 29 to Feb. 2, International Amphitheatre.

Murray D. Van Wagoner, president of the association, cited before the convention the need for increased highway construction, stating "It will take millions, perhaps billions, to build adequate, modern, limited access highways into the hearts of such great cities as New York, Chicago and Detroit.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Robins Conveying Belt Co., 15 Park Row, New York, plans one-story addition to plant on Meade Avenue, Passaic, N. J., 40 x 180 ft., to be equipped as a machine shop. Cost over $50,000 with equipment.

Municipal Metallic Bed Mfg. Corp., 297 Powell Street, Brooklyn, has purchased three-story industrial building, about 25,000 sq. ft. of floor space, at Merrick, L. I., formerly used by Midmer-Losh Organ Co., and will modernize and equip for new plant. Present works will be removed to new location.

Signal Corps Procurement District, 58th Street and First Avenue, Brooklyn, asks bids until Feb. 6 for armature and bearing assemblies, and ball bearings (Circular 267); until Feb. 7 for dynamotors (Circular 268), mountings (Circular 266); until Feb. 16 for binding post assemblies, lamp mountings, relays, circular levels, cover and reflector assemblies, etc. (Circular 252).

Aviation Mfg. Corp., 420 Lexington Avenue, New York, has superstructure under way for new plant on Murfreesboro Road, near Berry Field municipal airport, Nashville, Tenn. Cost close to $1,000,000 with equipment. Rock City Construction Co., Nashville, is general contractor.

A. Overholt & Co., Inc., 120 Broadway, New York, has let general contract to Sanderson & Porter, 52 William Street, engineers and contractors, for two-story addition to distillery at Broad Ford, near Connellsville, Pa. Cost close to $150,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 6 for one motor-driven portable metal shaper (Schedule 538), two electric heat treating furnaces (Schedule 554) for Brooklyn Navy Yard; steel hull rivets, medium and high-tensile (Schedule 582), steel tap rivets (Schedule 583) for Brooklyn and Philadelphia yards; 1000 fuel quantity check valves (Schedule 527), three motor-driven surface grinders (Schedule 547), thermocouple lead connectors, indicator thermocouple leads, engine thermocouple leads and gasket-type thermocouples (Schedule 528); until Feb. 9 for rivet sets (Schedule 593), four motor-driven oxygen transfer equipments and spare parts (Schedule 585) for Philadelphia Navy Yard.

Reynolds Metals Co., Inc., 539 West 25th Street, New York, plans one-story addition to branch plant at Louisville, 350 x 1540 ft., to be equipped as an aluminum rolling mill. Cost reported over $150,000 with equipment.

Board of Education, Park Avenue and 59th Street, New York, plans manual training department in new three-story high school at 8301-55 Shore Road, Brooklyn. Cost about $1,800,000. Bureau of Construction, 40 Flatbush Avenue Extension, Brooklyn, is in charge; Eric Kebben, last noted address, is architect for board.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Feb. 6 for gages (Circular 410), steel forgings (Circular 401), one printing press (Circular 409); until Feb. 7 for steel bar forgings for 14-in. gun (Circular 413), steel hand holders (Circular 417); until Feb. 9 for cast iron spur gears (Circular 422).

Elastic Stop Nut Corp., 1001 Newark Avenue, Elizabeth, N. J., has let general contract to Austin Co., Cleveland, for one-story and basement plant, 180 x 280 ft., on Vaux Hall Road, Union, N. J., recently acquired. Cost about $85,000 with equipment. Completion is scheduled in June.

Rex Cutlery Co., 261 Rose Street, Newark, N. J., has purchased one-story industrial building, about 18,000 sq. ft. of floor space, at 16-20 Cordier Street, Irvington, N. J., and will improve and equip for plant.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Feb. 5 for 42 portable hydraulic rams, each 10 tons capacity, with attachments for automotive repair trucks, and 36 similar rams, same capacity, for machine shop trucks (Circular 108); until Feb. 6 for 41,500 ft. of galvanized steel flexible wire (Circular 1071), two universal milling machines (Circular 1070), one 5-ton capacity hydraulic press, with motor and starting switch (Circular 1072).

BUFFALO DISTRICT

Spencer Kellogg & Sons, Niagara Square, Buffalo, has let general contract to James Stewart Corp., 343 South Dearborn Street, Chicago, for addition to branch mill at Decatur, Ill., including storage bins and other units. Cost over $200,000 with equipment.

American Box Board Co., Market Street, S. W., Grand Rapids, Mich., has acquired tract of land on Shawnee Road, near North Tonawanda, N. Y., with one-story buildings, formerly owned by R. G. Kittinger Shops, Inc., for new branch mill. A one-story addition will be built. Cost over $50,000 with equipment.

NEW ENGLAND

Pratt & Whitney Division, United Aircraft Corp., 400 Main Street, East Hartford, Conn., has let general contract to Robert G. Bent Co., 83 Edwards Street, Hartford, Conn., for one-story addition, for testing shop. Cost close to $45,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 6 for two motor-driven engine lathes (Schedule 543), one vertical pit-type, convected air-heated, electric furnace (Schedule 545) for Boston Navy Yard; two car-type furnaces (Schedule 550), three motor-driven ram-type universal turret lathes and spare parts (Schedule 540) for Portsmouth, N. H., Navy Yard.

Connecticut Light & Power Co., Hartford, Conn., is arranging fund of $2,600,000 for installation of additional equipment, transmission and distributing lines, power substations and other structures.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Feb. 6 for one machine, complete with dies, automatic feed, motor-driven stock reel and assembly device for producing spacer shown on drawing (Circular 260).

Wiremold Co., Railroad St., Elmwood, Conn., has awarded a contract to R. F. Jones Co., 15 Lewis St., Hartford, Conn., for a plant addition to cost $100,000 without equipment.

New York, New Haven & Hartford Railroad Co. last week closed bids for two steel framed workshops at East Hartford and Hartford, Conn.

WASHINGTON DIST.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for installation of turbo-alternator, condenser and auxiliary equipment in power house at Naval Air Station, Pensacola, Fla. (Specifications 9371).

Potomac Electric Power Co., Tenth and E Streets, N. W., Washington, is arranging appropriation of $7,231,000 for expansion in power plants, power substations and switching stations, transmission and distributing lines, and other facilities.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 5 for two lifting jacks, 20,000-lb. capacity, and four similar floor jacks, 7500-lb. capacity; 500 steel paint drums, 10-gal. capacity (Schedule 3868); until Feb. 6 for quantity of brake shoes for 33-in. cast iron wheels, hand barrel trucks, steel chains, etc. (Schedule 3864); until Feb. 12 for quantity of crane chain (Schedule 3880).

United States Engineer Office, 2100 Virginia Avenue, N. W., Washington, asks bids until Feb. 6 for three vertical motor-driven mine sinker pumping units and accessories (Circular 118).

Crown Cork & Seal Co., Inc., Baltimore, has asked bids on general contract for one-story addition for storage and distribution. Cost close to $40,000 with equipment. Lucius R. White, Jr., 10 West Chase Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 6 for installation of mechanical-type blast-cleaning room, suitable for using sand, steel grit and steel shot, complete with all necessary blast equipment, ventilating and dust-collecting systems (Schedule 567) for Boston Navy Yard; 150 tool stands and 250 tool cabinets (Schedule 535) for Alexandria, Va.; one radial drill (Schedule 529), one radial drill (Schedule 530), universal engraving machine (Schedule 532) (all motor-driven), 10 duplex type panels for welding outfits (Schedule 546), for Charleston, S. C., Navy Yard; until Feb. 9 for one motor-driven thread grinder (Schedule 549) for eastern or western navy yard.

SOUTH ATLANTIC

Public Works Officer, Naval Station, Jacksonville, Fla., asks bids until Feb. 15 for one 10-ton electric bridge crane (Specifications 9589).

Waynesboro Coca-Cola Bottling Co., Waynesboro, Ga., will take bids soon on general contract for two-story and basement mechanical-bottling plant. Cost about $50,000 with equipment. Scroggs & Ewing, SFC Building, Augusta, Ga., are architects; Robert S. Fiske, Healey Building, Atlanta, Ga., is engineer.

United States Engineer Office, Jacksonville, Fla., asks bids until Feb. 6 for cast chrome nickel steel ball joints (Schedule 351), two cast cutter shaft bearings, complete with cap and cap bolts (Circular 360), 72 cast manganese steel rock cutter teeth (Circular 354).

SOUTH CENTRAL

City Council, Chattanooga, Tenn., has secured Federal grant of $1,557,000 for expansion and improvements in municipal electric system. Electric Power Board in charge.

Baldwin Sugar Mill, Baldwin, La., operated by Randolph and Lee Roane, plans rebuilding of portion of cane sugar refinery recently destroyed by fire. Loss over $150,000 with equipment.

United States Engineer Office, Louisville, asks bids until Feb. 21 for two complete pumping plants at Tell City (Perry County), Ind.

Frederick Voorhies, secretary, Louisiana Flood Control and Water Conservation Commission, Baton Rouge, La., is at head of project to construct and operate a syrup mill in vicinity of Lafayette, La.

SOUTHWEST

Carter Carburetor Corp., 2840 North Spring Avenue, St. Louis, has let general contract to L. O. Stocker Co., Arcade Building, for four-story addition, 50 x 200 ft. Cost close to $185,000 with equipment. Company is affiliated with American Car & Foundry Co., New York.

City Council, Sterling, Kan., plans expansion and improvements in municipal power plant. Special election has been called on Feb. 6 to approve bonds for about $200,000 for project. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Columbia Brewing Co., 2000 Madison Street, St. Louis, will take bids soon on revised plans for top addition to present stock house, storage and distributing plant. Cost over $50,000 with equipment. Janssen & Janssen, Chemical Building, are architects.

Kansas City Limeolith Co., 2915 Southwestern Boulevard, Kansas City, Kan., plans rebuilding of portion of mill recently destroyed by fire. Loss about $50,000 with equipment.

Dr. Pepper Bottling Co., Austin, Tex., care

of Page & Southerland, Nalle Building Annex, architects, has let general contract to O. K. Johnson Co., Austin, for one and two-story mechanical-bottling plant, 60 x 110 ft., at Fifth Street and West Avenue. Cost about $60,000 with equipment.

First Texas Chemical Mfg. Co., 1810 North Lamar Street, Dallas, Tex., plans two-story top addition to plant. Cost over $45,000 with equipment.

Richter's Bakery, Inc., 430 South Laredo Street, San Antonio, Tex., will take bids soon on general contract for one and two-story plant on Broadway. Cost over $40,000. Charles T. Boelhauwe, 512 North Cherry Street, is architect; W. H. Lilly, Axtec Building, is engineer.

WESTERN PA. DIST.

Bethlehem Steel Co., Locust Street, Johnstown, Pa., has approved plans for one-story addition, 220 x 250 ft., to wire mill at local Cambria works, for storage and distribution. Erection will be carried out with company forces. Cost over $200,000 with machinery. W. C. Frank is chief engineer in charge.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, plans one-story addition, 140 x 140 ft., to branch mill at Arnold, near New Kensington, Pa., to be equipped for expansion in melting division and other departments. Cost close to $100,000 with machinery. J. W. Schreiber is company engineer, first noted address.

OHIO AND INDIANA

Humphryes Mfg. Co., Mansfield, Ohio, pumping machinery, plumbing equipment, etc., has let general contract to Jacob Wolfe Construction Co., Mansfield, for three-story addition for storage and distribution. Cost over $50,000 with equipment.

Columbus & Southern Ohio Electric Co., 215 North Front Street, Columbus, Ohio, is arranging fund of about $200,000 for extensions and improvements, and will also expend about $930,000 for similar purpose.

Elyria Coca-Cola Bottling Co., 1346 Lake Avenue, Elyria, Ohio, plans new one-story mechanical-bottling plant. Cost close to $45,000 with equipment.

Ohio Farm Bureau Co-operative Association, 246 North High Street, Columbus, Ohio, J. E. Keltner, treasurer, plans new one-story commercial fertilizer-manufacturing plant on Leonard Avenue, near Taylor Street. Cost about $150,000 with equipment. William W. Carlton & Associates, 1816 Central Parkway, Cincinnati, are engineers.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Feb. 5 for screws (Circular 975); one shaper and several lathes (Circular 912); until Feb. 6 for one wood shaper, V-belt drive (Circular 998), light assemblies, manifold assemblies, bow-stiffening assemblies, scoop assemblies and switch assemblies (Circular 970); until Feb. 7 for six oil temperature regulator assemblies, 13-in., complete with viscosity valve (Circular 996); until Feb. 9 for 156 air compressors, 60-cycle and 25-cycle types (Circular 969), landing lamp socket assemblies (Circular 990); until Feb. 12 for oxygen cylinder assemblies (Circular 974), 575 engine unit mounting stand assemblies (Circular 966); until Feb. 13 for one dual magneto test bench (Circular 997).

Board of Public Works, Decatur, Ind., asks bids until Feb. 8 for extensions and improvements in municipal power plant. Froehlich & Emery Engineering Co., Second National Bank Building, Toledo, Ohio, is consulting engineer.

Pittsburgh Valve & Fittings Co., Barberton, Ohio, has leased one-story industrial building, about 10,000 sq. ft. of floor space, at 2720 West Thirty-fifth Street, Chicago, and will occupy for new factory branch, storage and distributing plant. Local offices of company are at 332 South Michigan Avenue.

MICHIGAN DISTRICT

Brown-McLaren Mfg. Co., 5853 West Fort Street, Detroit, screw machine products, reamers, etc., plans one-story addition, including improvements in present plant. Cost close to $45,000 with equipment. Christian W. Brandt, Eaton Tower Building, is architect.

United States Engineer Office, Federal Building, Detroit, plans one-story equipment warehouse and distribution building for use in conjunction with local locks and canal on St. Mays River. Cost about $200,000.

Detroit Harvester Co., 5450 West Jefferson Street, Detroit, has let general contract to Fullerton Construction Co., 11733 Russell Street, for one-story addition. Cost close to $40,000 with equipment.

Dossin's Food Products, Inc., 3659 Gratiot Street, Detroit, has work under way on one-story addition, for which general contract recently was let to Banbrook-Gowan Co., 1829 Woodward Avenue. Cost close to $45,000 with equipment.

MIDDLE WEST

Western Electric Co., Cermak Road and Cicero Avenue, Chicago, has let general contract to A. L. Jackson Co., 161 East Erie Street, Chicago, for one-story addition, 100 x 100 ft. Cost over $60,000 with equipment. A. T. Hunt is chief engineer for company, which is affiliated with American Telephone & Telegraph Co., New York.

Waukesha Foundry Co., Lincoln Avenue, Waukesha, Wis., plans one-story addition to foundry, 65 x 225 ft., for expansion in stainless steel and aluminum casting divisions. Cost over $75,000 with equipment. Mark F. Ffaller, 8525 Ravenswood Circle, is architect.

Commanding Officer, Ordnance Department, Savanna Proving Ground, Savanna, Ill., asks bids until Feb. 8 for quantity of steel bomb dunnage (Circular 14).

Southern Colorado Power Co., Pueblo, Colo., plans expansion in local electric power plant, including steam turbine-generator unit, boiler and accessories. Cost about $1,000,000.

Gate City Iron Works, 1602 North Eleventh Street, Omaha, Neb., has approved plans for one-story and basement storage and distributing plant, 105 x 310 ft., on North Eleventh Street, and will carry out erection by day labor. Cost close to $45,000 with mechanical-handling and other equipment.

Square D Co., 710 South Third Street, Milwaukee, has acquired tract of land on Capitol Drive, near North Richards Street, as site for new plant. Initial unit will be one-story, about 100,000 sq. ft. of floor space. Cost close to $175,000 with equipment.

Poynette, Wis., will close bids about Feb. 5 on 50,000-gal. steel or wood tank on 120-ft. tower. General Engineering Co., Portage, Wis., is contractor.

PACIFIC COAST

Lloyd A. Fry Roofing Co., 1501 North Tamarind Street, Compton, Los Angeles, has let general contract to Myers Brothers, 3407 San Fernando Road, for new one-story plant, 225 x 400 ft., to replace former local works destroyed by fire. Cost close to $100,000 with equipment. H. Sage Webster, 717 West 165th Place, Gardena, Cal., is engineer. Main offices are at 5302 West Sixty-sixth Street, Chicago.

Commanding Officer, Ordnance Department, Benicia Arsenal, Benicia, Cal., asks bids until Feb. 19 for one motor-driven lathe, 16 x 78 in. between centers (Circular 42).

San Diego Consolidated Gas & Electric Co., Electric Building, San Diego, Cal., is arranging fund of about $2,800,000 for expansion, to include a new steam-electric generating station.

La Habra Citrus Association, La Habra, Cal., has asked bids on general contract for two-story and basement addition to plant, 101 x 138 ft., with facilities for handling about 125 additional cars. Cost over $75,000 with equipment. An air-conditioning system will be installed to cost close to $20,000. W. W. Ache, 301 North Citrus Avenue, Los Angeles, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 6 for one gas-fired car-type core oven, without door and door hoist mechanism, external heating system; one similar core oven, external heating system; one similar core oven, external heating system, double end, with two vertical lift doors; one similar core oven, integral heating system (Schedule 515), electric cable (Schedule 524); until Feb. 13 for one motor-driven vertical shaper (Schedule 556), one motor-driven contour metal sawing, filing and polishing machine (Schedule 557) for Mare Island, Cal., Navy Yard; until Feb. 6 for one bench-type, hand-operated connecting rod boring fixture (Schedule 511) for Seattle yard; one motor-driven electric moulder (Schedule 484); until Feb. 9 for four units of boat and airplane crane, power equipment and control, complete for hoisting, topping and rotating drives, including spare parts (Schedule 537) for Puget Sound, Wash., Navy yard.

CANADA

National Steel Car Corp., Ltd., Kenilworth Avenue, Hamilton, Ont., has awarded structural steel contract to Hamilton Bridge Co., Ltd., Hamilton, for one-story, 300 x 700 ft., addition to airplane assembly plant at Malton, Ont.

Canadian Carborundum Co., Ltd., Niagara Falls, Ont., has awarded contract to R. Timmins Construction Co., 221 Burgar Street, Welland, Ont., for two-story addition, 48 x 55 ft.

Port Arthur, Ont., will build independent sewage system for Current River area to cost $150,000. S. E. Flook is engineer.

W. R. Campbell, chairman, War Supply Board, Ottawa, is receiving bids for sewage pumping station, etc., at Camp Borden, Ont., to cost about $100,000.

Broulan Porcupine Mines, Porcupine, Ont., plans construction of 300-ton mill.

Joliette Steel Ltd., Joliette, Que., has awarded general contract to Corinthian Construction Co., Ltd., 5726 Sherbrooke St., W., Montreal, for foundry and pattern storage building to cost $20,000.

FOREIGN

Australian Consolidated Industries, Ltd., Sydney, New South Wales, Australia, plans completely integrated plant for manufacture of automobiles, comprising units for foundry, forge shops, machine shops, assembling and inspection shops, and other structures. Government of Australia is interested in project and will provide necessary financing. Cost about £1,500,000 with machinery. William J. Smith, managing director, will soon arrive in this country for purchase of machinery.

Department of Civil Aviation, Government of Mexico, D. F., plans new airport at Cerro Loco, Oaxaca State. Cost over $200,000 with equipment.

Crucible Opens New St. Louis Warehouse

MORE than 400 guests attended the opening of the Crucible Steel Co. of America's new enlarged St. Louis branch and warehouse on Jan. 20. Joining R. C. Oram, St. Louis manager, on the welcoming committee was Crucible's president, R. E. Desvernine, A. T. Galbraith, vice-president in charge of sales, R. E. Christie, assistant to the president and J. P. Woodlock, director of warehouse sales.

The new quarters are located at 1021-27 Chouteau Avenue, St. Louis. Mr. Desvernine presented a dinner to the Crucible employees at the Missouri Athletic Club.

THIS WEEK'S MACHINE . . . TOOL ACTIVITIES . . .

. . . Mixed trends in domestic ordering . . . Some automotive buying reported . . . Aircraft production still in the ascendency . . . No easing of delivery situation seen except at Cleveland, where new business has tapered.

Gain in Domestic Buying Reported at Cincinnati

CINCINNATI — Interest in machine tools in the southern Ohio area appears to have returned to approximately the December level. Current business indicates an upward tendency in domestic ordering, with reports of a rather broad interest in the automotive field. In fact, one manufacturer of broaching machinery reported several substantial orders from various automotive manufacturers. Drilling machinery is enjoying a brisk demand with ordering from broad domestic sources, manufacturers being disposed to adopt a selective attitude toward foreign demand. U. S. Government orders, particularly for lathes, were one of the chief sources of improved demand during the past week, one manufacturer indicating the sale of 15 machines to this source.

Deliveries continue to be a source of great concern to local manufacturers, as shipping promises seem to become more and more extended. Shortest period is about 12 weeks, while many manufacturers indicate that on various types of tools they are now quoting 40 weeks and even a year. Production continues to be at full factory capacity with night forces running five days in most plants.

Domestic Orders off Sharply Cleveland Builders Report

CLEVELAND—New business has tapered for some producers in this vicinity, with domestic orders off sharpest of all classifications, but the breathing spell actually is welcomed, as it will help facilitate getting production into better alinement for the further reduction of the large order backlogs which are held.

Expiration of the trade treaty with Japan means very little to the industry, as many commitments have been cleaned up already and the unfinished machines that remain can still be shipped. Cash with order has been a strict rule in dealing with Japan. A buyer is reported en route to the United States from Australia to purchase tools for the proposed automobile plant mentioned here several weeks ago. England is complaining over the cash requirements necessitated by law.

The airplane equipment industry remains in peak production here. One airplane parts manufacturing firm here which purchased machine tool equipment heavily in 1939, and expanded its plant generously, has a three-year order backlog and faces possible large increases in domestic demand later this year. More and more companies are getting into the airplane parts business, one of the most recent being Goodyear Aircraft Corp. in Akron.

January Showed a Gain Over December in New York Area

NEW YORK—Despite a slow and erratic start, January showed up as a better month than December in point of sales volume in this area, according to preliminary estimates. Dealers were encouraged by fairly well diversified demand from industry, but if this had been the only source of buying, the gross for the month would have been poor. Renewed and substantial buying on the part of the aircraft engine and parts industry was chiefly responsible for the gain, seconded by arsenal and navy yard buying. Not much change in the picture is expected this month, although quotations from general sources are still active. Spottiness will probably continue to prevail because of the concentration of orders in a single industry.

Both the British and French purchasing commissions have indicated recently that buying of aircraft engines and planes will be maintained throughout the war, accounting for the series of expansion programs through which the industry has been going since last September. Much of the machinery is being bought with the substantial amounts of cash initially paid by the Allied governments when the contracts for engines and planes were signed. It is officially denied that the French have paid for the purchase of machinery outright in order to speed up production of engines, now acknowledged by our own government to be the bottleneck of the aircraft industry. On the other hand, there is very close coordination as regards priority of delivery on machine tools destined for aircraft production abroad and for that in the United States. As a result, delivery of machinery locally is even ahead of building programs.

Month of Slow Sales Ended at Chicago

CHICAGO—January machine tool business has been slow generally, but following the tremendous buying movement in the final quarter of 1939, this situation is not surprising. The Nash program for its Kenosha, Wis., plant is the feature of this market at present, and most of the equipment is expected to be placed by Feb. 1. Inquiries are pending from several farm equipment plants, the arsenal at Rock Island and the Illinois Central. Demand for small tools during the month was also light.

Australia to Buy Tools For Auto Production

WILLIAM J. SMITH, managing director, Australian Consolidated Industries, is enroute to the United States to purchase machine tools and employ supervisory production engineers to establish a Government-backed automobile plant in Australia. The cost will be about $6,000,000. The Government will provide a bonus on 60,000 motors of 15 hp. or over to an Australian owned and controlled company, beginning at $120 for the first 20,000 motors and dropping to $80 for the third 20,000. The plan calls for the Government to grant a five-year monopoly to the Australian Consolidated Industries.

In the past, the practice has been to import motors and chassis from Great Britain, Canada and the United States and to add to them Australian-made bodies, many of them manufactured by American branch factories. During the last fiscal year, Australia imported $25,000,000 worth of automobile and truck engines, chassis and parts.

Union Metal Mfg. Co. Absorbs Chicago Company

CANTON, OHIO—Union Metal Mfg. Co. has absorbed the Corrugated Steel Sheet Piling Corp., Chicago. Alexander Mayer, former president of the Chicago corporation, will be placed in charge of sales of the sheet pilings which will be manufactured here.

Utility to Spend $21,000,000

ST. LOUIS—The Union Electric Co. of Missouri has announced a $21,000,000 construction and improvement program for 1940. Details announced by Edward T. Gushee, executive vice-president, include $12,629,700 for work on power plants. Two generating units of 40,000 kw. each will be installed. Additional expenditures of $3,000,000 to $5,000,000 are planned for 1941.